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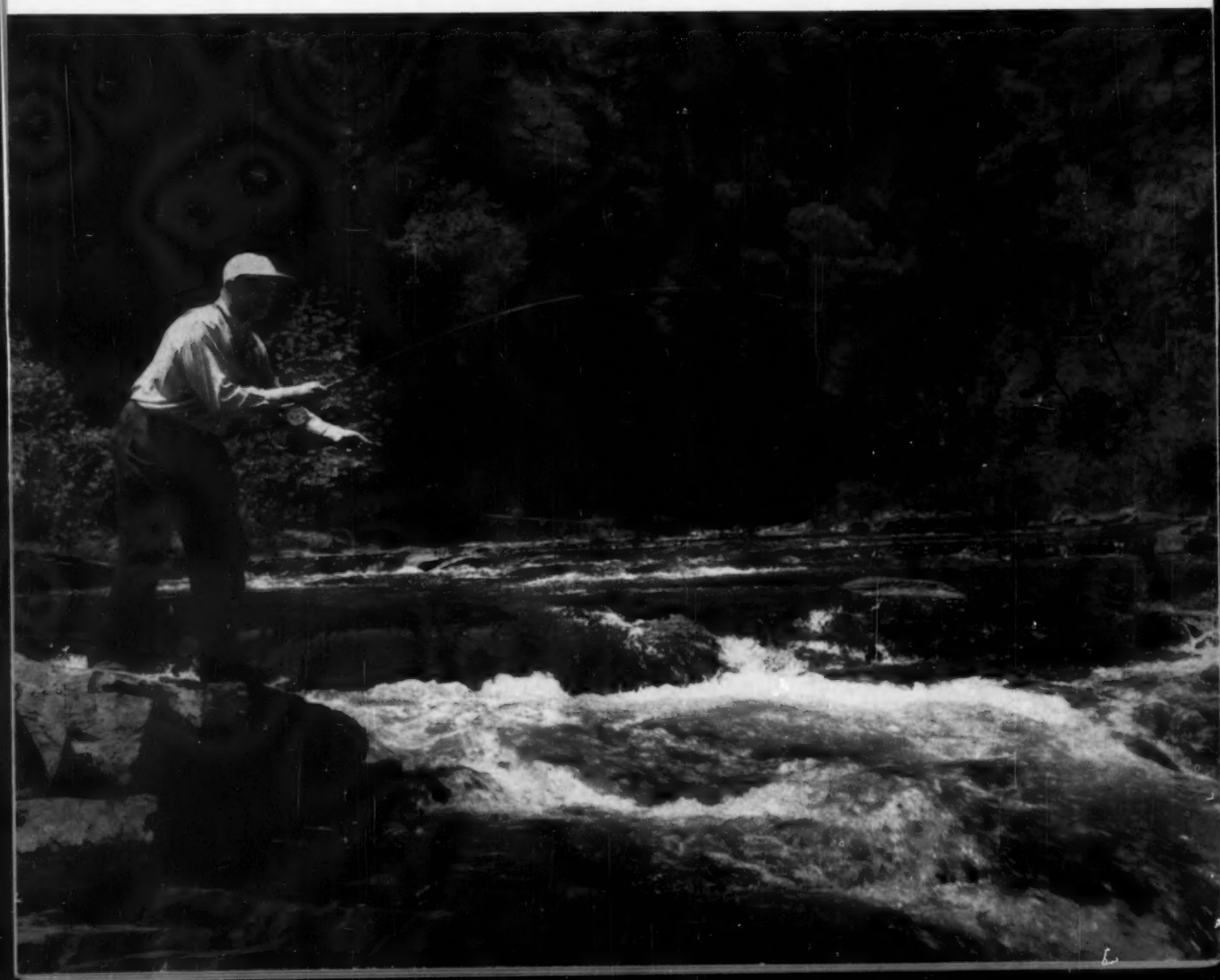

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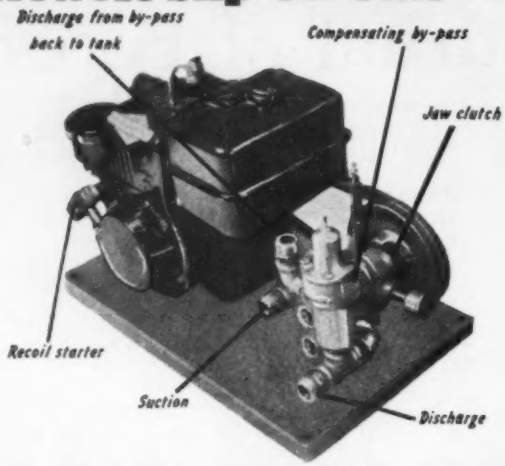

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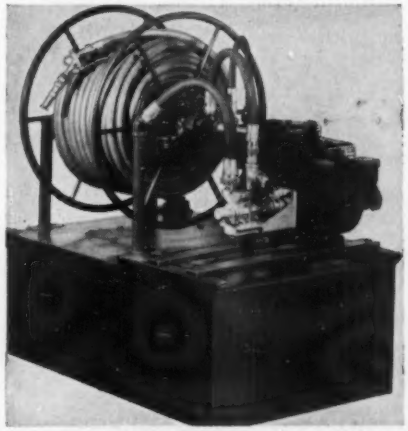

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Some Observations on Yield and Early Thinning in a Douglas-Fir Plantation

Norman P. Worthington

DEPENDENCY upon planting to reestablish harvested Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) stands in the Pacific Northwest is increasing. Planting results in quicker and more uniform regeneration than does natural seeding, and rising stumpage prices have stimulated foresters to hasten reestablishment by this means, thereby increasing total timber yield.

As plantations become more numerous, there is an increasing interest in their yield as compared with that of natural stands. One of the older Douglas-fir plantations in the region, in the Olympic National Forest of northwestern Washington, provides an opportunity for such a comparison. The Snow Creek Plantation, which covers about 1,500 acres on the east side of the Olympic Peninsula, was established[1] in 1927-1929 to reforest part of a heavily burned timber sale area, logged before 1925 (Fig. 1). Growth plots established in 1951 were measured that year and in 1956.

Foresters in the Pacific Northwest also wish to know more about the possible advantages of early thinning and resultant wider spacing of young-growth Douglas-fir. There is interest, too, in the feasibility of early thinning. Part of the Snow Creek Plantation was thinned in 1951 and again in 1956.

In this discussion, yield of the Snow Creek Plantation is also compared with yields of planted loblolly and slash pines in Louisiana and Douglas-fir in Great Britain.

Study Plots

In 1951, in preparation for a long-term thinning trial, three ½-acre growth plots were laid out in the plantation. Two of the plots were in an area that was to be thinned, and one was in an area that would not be thinned. The physical characteristics of all three plots are much the same. Elevations are about 1,300 feet, slopes are less than 20 percent, and aspects are mainly easterly and southeasterly. The soil is of the Blyn series, which includes well-drained podzolic soils developed from medium-textured glacial drift material of local sedimentary bedrock. Soil profile is chiefly silt loam underlain with gravelly loam. Mean annual precipitation ranges from 45 to 60 inches, and mild, wet winters of light snowfall and relatively dry summers are characteristic. Site index is 150 feet (height at 100 years), or a high Site III, based on an age of 31 years.

Part of the plantation was thinned in 1951 and again in 1956 as an experimental project of the Pacific Northwest Forest and Range Experiment Station. This was the first Douglas-fir plantation in the Pacific Northwest to be thinned commercially.

In 1956, Station pathologists laid out two 10-acre blocks next to the thinning-trial area to observe the incidence and spread of laminated root rot. These blocks have no connection with the thinning trial, but the average volume per acre computed for the 20 acres was almost

FIG. 1.—Snow Creek area, Olympic National Forest, at time of planting in 1927. This particular area had been logged and burned 3 years earlier.

THE AUTHOR is on the staff of the Pacific Northwest Forest and Range Expt. Sta., Forest Service, U. S. Dept. Agric., Portland, Ore.

[1]Stock for the plantation was raised at the Wind River Nursery, in southwestern Washington from seed gathered near Roy, Wash. The 2-0 seedlings were spaced 8×8 feet at an average planting cost of $8.40 per acre.

FIG. 2.—Appearance of Snow Creek Plantation when first thinned, a quarter century after planting. (*Photo courtesy Crown Zellerbach Corp.*)

identical to that which was estimated from the half-acre study plots. This consistency of measurement illustrates the uniformity of the plantation and suggests a high degree of sampling accuracy.

Thinnings

The first thinning was made in April 1951, 24 years after the plantation was established (Fig. 2). A 5-acre area was thinned by a 2-man crew, felling with a small power saw and skidding with a horse. This was chiefly a crown thinning, with emphasis on reducing competition for the better dominants and codominants. A few rough dominants and poorly formed codominants were removed, but it was impracticable to salvage any suppressed or intermediate trees as they were below the minimum economic size of 6 inches d.b.h.

Average d.b.h. of the stand before thinning was 7.6 inches in trees 6 inches and larger.

Approximately 5 cords per acre, in trees averaging 8.1 inches d.b.h., were removed. This amount was 13 percent of the merchantable stand volume. The trees were bucked into 50-inch pulpwood, loaded by hand, and trucked 35 miles to Port Angeles for manufacture into newsprint. It was necessary to subsidize the operation because thinning was new to the contractor, the haul was somewhat long, the product was of low value, and production amounted to only 0.94 cord per man-day.

TABLE 1.—YIELD OF SNOW CREEK PLANTATION COMPARED WITH NORMAL YIELD, 1956 (ACRE BASIS)

Item	Unit of measure	Yield		Ratio: Snow Creek yield to normal yield
		Normal[1]	Snow Creek[2]	
				Percent
Trees	Number	713	552	77
Average d.b.h.	Inches	6.2	7.9	127
Basal area	Square feet	147.8	188.4	127
Cubic volume:				
Entire stem	Cubic feet	3,824	5,360	140
Merchantable stem[3]	Cubic feet	2,740	4,583	167
Board-foot volume	Board feet	11,068[4]	17,614[5]	159

[1]The yield of Douglas-fir in the Pacific Northwest (*9*). Values are for site index 150, interpolated for age 31 years. International board-foot values are adjusted from ⅛- to ¼-inch kerf.

[2]Data are (1) for all trees, except as otherwise noted, and (2) from the unthinned plot.

[3]Trees 5.6 inches d.b.h. and over, to a 4-inch top.

[4]International ¼-inch rule. Trees 6.6 inches d.b.h. and over, to a 5-inch top.

[5]International ¼-inch rule. Trees 7.6 inches d.b.h. and over, to a 6-inch top.

Five years later, in June 1956, a second experimental thinning was made. Cutting criteria were similar to those used in the first thinning, except that the cut was considerably heavier, with greater emphasis on thinning in the upper crowns. Extraction methods were also similar, but loading was facilitated by a forked-lift loader. The trees were cut into 100-inch pulpwood and trucked to Port Angeles.

An average of 10.6 cords per acre was harvested, with cut trees averaging 7.8 inches d.b.h. This was 17.2 percent of the stand. The cut included 1 cord per acre of merchantable volume salvaged from dead and down trees that had died during the previous 5-year period. Because of increased efficiency—from 0.94 to 1.68 cords per man-day—and a higher selling price for the delivered pulpwood, a nominal profit was realized.

Following completion of the second experimental thinning, the Olympic National Forest made several thinning sales in the plantation to local pulpwood producers. Through August 1958, 173 acres were thinned, yielding 1,551 cords of pulpwood. All material was manufactured into paper pulp at Port Angeles. These thinnings are continuing as access roads are developed, but being rather marginal commercial ventures, they can support only minor road development and stumpage charges. Although it is too early to make valid comparisons between thinned and unthinned stands, commercial thinning for pulpwood was shown to be economically feasible.

Yield

Since this experimental thinning project was only 5 years old when the data were obtained, no legitimate comparison between the yield of thinned and unthinned areas can yet be made. Based upon data obtained from the unthinned plot, which is very similar in stand characteristics to the thinned plots, the plantation has produced a substantial volume since its establishment in 1927 (Table 1). The merchantable cubic volume in 1956 approximated 56 cords of pulpwood per acre, the equivalent of better than 17,000 board feet of lumber.

TABLE 2.—PERIODIC AND MEAN ANNUAL INCREMENT SNOW CREEK PLANTATION (ACRE BASIS)

Item	Unit of measure	Periodic (1951-1956)		Mean (1927-1956)	
		Thinned	*Unthinned*	*Thinned*	*Unthinned*
Average d.b.h.	Inches	0.24	0.20	0.25	0.25
Average height	Feet	2.4	2.2	2.1	2.1
Basal area	Square feet	5.1	4.7	6.0	6.1
Cubic volume:					
Entire stem	Cubic feet	268	278	169	173
Merchantable stem[1]	Cubic feet	284	289	144	148
Board-foot volume[2]	Board feet	1,729	1,943	538	568

[1]Trees 5.6 inches and over, to a 4-inch top.
[2]International ¼-inch rule. Trees 7.6 inches d.b.h. and over, to a 6-inch top.

TABLE 3.—PERIODIC ANNUAL MORTALITY SNOW CREEK PLANTATION, 1951-1956 (ACRE BASIS)

Item	Unit of measure	Stand	
		Thinned	Unthinned
Basal area	Square feet	2.0	2.8
Cubic volume:			
Entire stem	Cubic feet	48	72
Merchantable stem	Cubic feet	22	40
Board-foot volume[1]	Board feet	7	49
Proportion of cubic volume (merchantable stem) salvaged	Percent	73	0

[1]International ¼-inch rule.

To date, net increment of the Snow Creek Plantation, for both thinned and unthinned stands, has been higher than that of comparable natural stands (as indicated by normal yield). Average mean annual increment over the life of the plantation (through 1956) has been 146 cubic feet of merchantable volume, or 553 board feet, International rule (Table 2). Such increment is 64 percent in excess of normal for cubic merchantable volume and 55 percent in excess of normal for board-foot volume.

Periodic annual increment (1951-1956) was roughly twice that of mean increment for merchantable cubic-foot measure, and 3½ times the mean for board-foot measure. Periodic annual merchantable cubic-foot increment will continue to exceed the mean until age 70 and possibly longer (*9*), depending upon the success of growth maintenance through thinning. As in natural stands, basal area increment has already culminated, probably at about age 20.

Comparison of plantation yields with normal yields shows the plantation yields to be considerably higher, except in number of trees. Averages range from 27 to 67 percent above normal, with the greatest differences in merchantable cubic-foot volume and board-foot volume.

The average d.b.h. for all trees in 1956 was 7.9 inches; for trees over 6 inches, average d.b.h. was 8.6 inches. Diameters of the trees have increased an average of 0.25 inch annually. Average total height for all trees was 64 feet; for dominants, 71 feet. Mean annual height growth averaged 2.1 feet for all trees; 2.3 feet for dominants.

Mortality

Mortality from 1951 to 1956 (Table 3) amounted to only 7 percent of the gross annual, merchantable cubic-volume increment of the thinned stand. In the unthinned stand, it amounted to 12 percent.

As the stands mature, mortality differences between the thinned and unthinned stands will probably increase markedly. Salvage of 73 percent of the volume of merchantable stem mortality through thinning in effect brings gross and net cubic increment very close. Chief causes of mortality have been laminated root rot in the larger stems and suppression in the smaller stems.

Discussion

The volumes on the growth plots indicate the great productive capacity of the plantation. During the first 30 years—perhaps 35 to 40 percent of rotation length—yield was 40 to 65 percent more than that of a normal natural stand. That such a margin can be maintained has not yet been demonstrated. However, British and Danish experience with planted Douglas-fir suggests that it may be possible (*4, 6*). Should such be the case, the substantially larger yield would amply justify the expense of planting or heavy, precommercial thinning needed to insure rapid, unimpeded growth in natural stands.

Higher early yield from Douglas-fir plantations than from natural stands is a result of more precise and wider spacing at the time of establishment, plus a common start, thus eliminating any delay in full stocking. Trees can grow rapidly with less competition for at least their first 15 years, and hence become both taller and larger in diameter (*5, 10*). In a fully stocked natural stand, trees compete more strongly almost from establishment, and development suffers accordingly (*3*). Thinnings repeated at 3- to 6-year intervals will sustain uniform, uncrowded spacing, will salvage merchantable mortality, and will allocate growth to larger, better formed trees—thereby increasing merchantable yield per acre.

A noticeable feature of the planted trees is the larger size and number of their limbs compared with those of trees in fully stocked natural stands. This condition, a result of wider spacing and more rapid initial growth, is likely to make little difference in grade of lumber produced. In either case, unpruned Douglas-fir on rotations of less than 100 years will produce but little clear lumber (*2, 7*). Should clear wood be desired, pruning will be fully as practical in plantations as in natural stands.

Yield of planted Douglas-fir at Snow Creek (thinned stand), though considerably less than that realized in Great Britain, is quite similar to yields of loblolly and slash pine plantations in Louisiana (Table 4). Such similarity has been noted previously in a more extensive yield comparison of Douglas-fir and loblolly pine (*11*). Compared at the 31-year age level, British Douglas-fir yield exceeds that at Snow Creek by 67 percent,

TABLE 4.—YIELDS OF DOUGLAS-FIR, LOBLOLLY PINE, AND SLASH PINE AT AGE 31 YEARS
(ACRE BASIS)

Item	Unit of measure	Douglas-fir		Loblolly pine (*8*)	Slash pine (*12*)
		Snow Creek	Great Britain (*1, 6*)		
Trees	Number	412	252	167	272
Average d.b.h.[1]	Inches	10.4	13.0	9.6	—
Basal area	Square feet	188	164	103	—
Merchantable stem volume:					
Residual	Cubic feet	3,445	4,766	2,856	3,238
Thinnings	Cubic feet	1,113	2,830	1,550	1,789
Total yield	Cubic feet	4,558[2]	7,596	4,406	5,027

[1]100 largest trees.
[2]Data from the two thinned plots.

whereas southern pine enjoys only a 3 percent advantage. Both British and Louisiana data reflect the benefit of additional volume obtained through numerous early thinnings.[2]

Utilization standards are only slightly closer in the South than in the Pacific Northwest, but they are materially closer in Great Britain—much of the volume used in Great Britain is premerchantable by American standards. It is of interest that the 100 largest trees in the British plantation have an average d.b.h. 2.7 inches larger than that at Snow Creek—a result of wider spacing with 160 fewer trees per acre.

Summary of Observations

A recent measurement of planted 31-year-old Douglas-fir on the Olympic National Forest in northwestern Washington showed yield to be markedly higher than normal yield. Merchantable volume yields of 4,583 cubic feet and 17,614 board feet were obtained on a 150-foot site index—increases of 64 and 55 percent over yields from natural stands.

Average height of the entire stand was 64 feet, with average for dominants 71 feet. Mean and periodic annual merchantable increment per acre of 148 cubic feet (1.85 cords) and 289 cubic feet (3.58 cords) have resulted. Periodic mortality has thus far been low.

The greater growth of the planted trees is attributed to more exact spacing, which permits a rapid, less inhibited development of individual trees. As a result plantation trees have larger and more numerous limbs than trees in natural stands, but it is believed their effect on lumber quality will be small. However, pruning would be practical if clear wood is desired.

Two thinnings at ages 26 and 31 years have demonstrated the feasibility of thinning as commercial practice.

Yields of thinned stands in the Snow Creek Plantation compare very closely with those of loblolly and slash pine of the same age. Planted Douglas-fir stands in Great Britain exhibit a 67 percent greater yield, due chiefly to closer utilization and skillful manipulation of density.

Continued light, frequent thinnings as the stand matures can be expected to sustain initial yield rate of planted Douglas-fir through maintenance of favorable spacing and salvage of mortality.

[2]Seven thinnings for British Douglas-fir; 3 for slash pine; 4 for loblolly.

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Capital Gains — Federal Income Tax

Nelson T. Samson

INCOME from the sale or cutting of timber may qualify for capital gains treatment, which under normal circumstances, is advantageous to the taxpayer. This paper will deal primarily with the so-called "Timber Provisions" of the 1954 Internal Revenue Code, more specifically referred to as Section 631a and Section 631b. Section 631 is normally the section consulted when seeking capital gains treatment for timber transactions, but it is not the sole means of obtaining this preferential treatment.

If timberland or standing timber is investment property, has been held for more than six months, is not held for sale in the ordinary course of trade, and is not used in the taxpayer's trade or business, its sale, for cash, may qualify as a capital gains transaction under Section 1221.

If standing timber is real property for tax purposes, is not held primarily for sale to customers, has been owned for more than six months, and is used in the taxpayer's trade or business, its sale for cash, may be a capital gains or ordinary loss transaction under Section 1231 (*10*). It should be noted that if the timber or timberlands are held by a dealer primarily for sale to customers in the ordinary course of trade neither Section 1221 nor Section 1231 is applicable.

Rowen (*7*) feels that the same rules should apply where the owner sells all or part of his interest in the timber, for cash, regardless of the fact that he retains the fee. To substantiate his opinion he cites, Cf. I. T. 2524, IX-I CB 199, and G.C.M. 12118, XII-2 CB 119, where the Internal Revenue Service ruled that a landowner may realize capital gains on an outright sale of his interest in minerals on the land, notwithstanding the fact that he retains the fee.

Casual sales of timber coming under Section 1231 will be treated as capital gains regardless of how sold. While the definition of a casual sale is not too explicit, it would appear that the timber in question must have been purchased for use in the taxpayer's trade or business, and then have been sold for a definite reason such as having an excess of timber, the desire to consolidate holdings, etc.

While the foregoing might lead to capital gains treatment of income from the sale of timber, they are only applicable to a small percentage of timber transactions. Section 631 of the 1954 Code, which has a much greater range of applicability will be discussed at length.

Section 631a, Internal Revenue Code, 1954.—Section 631a of the 1954 Code is the counterpart of Regulation 118, Section 117 (k) (1) in the 1943 amendments.

This section, 117 (k) (1), was included as a relief provision designed to rectify tax discrimination existing against taxpayers who cut their own timber and to put them on a comparable footing with those who sold their timber outright to others. Prior to this amendment, income realized by the taxpayer from cutting his own timber for use in his own business was taxable at ordinary income rates. Section 631a reads as follows:

> *Election to Consider Cutting as Sale or Exchange.*—If the taxpayer so elects on his return for a taxable year, the cutting of timber (for sale or for use in the taxpayer's trade or business) during such year by the taxpayer who owns, or has a contract right to cut, such timber (providing he has owned such timber or has held such contract right for a period of more than 6 months before the beginning of such year) shall be considered as a sale or exchange of such timber cut during such year. If such election has been made, gain or loss to the taxpayer shall be recognized in an amount equal to the difference between the fair market value of such timber, and the adjusted basis for depletion of such timber in the hands of the taxpayer. Such fair market value shall be the fair market value as of the first day of the taxable year in which such timber is cut, and shall thereafter be considered as the cost of such cut timber to the taxpayer for all purposes for which such cost is a necessary factor. If a taxpayer makes an election under this subsection, such election shall apply with respect to all timber which is owned by the taxpayer or which the taxpayer has a contract right to cut and shall be binding on the taxpayer for the taxable year for which the election is made and for all subsequent years, unless the Secretary or his delegate, on showing of undue hardship, permits the taxpayer to revoke his election; such revocation, however, shall preclude any further elections under this subsection except with the consent of the Secretary or his delegate. For purposes of this subsection and subsection (b), the term "timber" includes evergreen trees which are more than 6 years old at the time severed from the roots and are sold for ornamental purposes.

Dates applicable.—Section 631a is applicable to taxable years beginning after December 31, 1953, and ending after August 16, 1954.

Holding period.—The taxpayer must have been the owner of the timber or the contract right to cut the timber for more than six

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months prior to the beginning of the tax year in which it was cut.

Election.—The election must be made by the taxpayer and such election shall apply to all timber owned by the taxpayer or which the taxpayer has a contract right to cut and shall be binding upon the taxpayer for the taxable year for which the election is made and for all subsequent years. Hoffar (*4*) suggests that the election was included for the following reasons:

> There are two reasons for providing for this election, the first being that it will eliminate much administrative difficulty, and the second reason being that there is a grave doubt as to whether or not a taxpayer can be forced to pay a tax on an increment in value at the time of cutting a tree when he may not have received nor realized any actual income from the sale of the timber or the products therefrom. However, if he voluntarily consents to be taxed upon such increment at the time of cutting the timber that would appear to meet all requirements so as to eliminate the legal difficulty.

It is immaterial whether such timber or contract right was acquired before or after the election. The election in the return shall take the form of a computation under the provisions of Section 631 (a) and Section 1231. The taxpayer is denied the right to make his initial election upon an amended return.[1] Where the timber properties are owned by a partnership, the election to have 631a apply must be exercised by the partnership.[2]

Revocation of election.—The Secretary, or his delegate, may permit the taxpayer to revoke his election on showing of undue hardship; such revocation, however, shall preclude any further elections except with the consent of the Secretary or his delegate.

Use of timber cut.—Timber must be cut for sale or use in the taxpayer's trade or business. The election above affects only timber that is cut by the taxpayer, and has no effect upon timber disposed of by other means. In this regard, the regulations state:[3]

> For any taxable year for which the cutting of timber is considered to be a sale or exchange of such timber under section 631 (a), the timber so cut shall be considered as *property used in the trade or business* for the purposes of section 1231, along with other property of the taxpayer used in the trade or business as defined in section 1231 (b), regardless of whether such timber is property of a kind which would properly be includible in the inventory of the taxpayer if on hand at the close of the taxable year or property held by the taxpayer *primarily for sale to customers in the ordinary course of his trade or business.*

Time of cutting.—The regulations provide that "timber shall be considered cut at the time when in the ordinary course of business the quantity of timber felled is first definitely determined."[4]

Christmas trees.—

> For purposes of section 631 (a) and this section, the term "Timber" includes evergreen trees which are more than six years old at the time severed from their roots and are sold for ornamental purposes, such as Christmas decorations. Section 631 (a) is not applicable to evergreen trees which are sold in a live state, whether or not for ornamental purposes. Tops and other parts of standing timber are not considered as evergreen trees within the meaning of section 631 (a). The term "evergreen trees" is used in its commonly accepted sense and includes pine, spruce, fir, hemlock, cedar, and other coniferous trees.[5]

It appears that sellers of balled nursery stock will not qualify because their stock is sold in a "live" state and is not severed from the roots.

Proprietary interest.—The Revenue Service has stated,[6] that in order for an owner of a contract right to cut timber, under 631a, to be eligible for capital gains treatment he must have a proprietary interest in the timber which he cuts. It is made clear that the person having the cutting rights, in order to have a proprietary interest, must have an unrestricted right to sell the logs or use them in his trade or business. If the grantor reserves the right to purchase the logs or to sell them in his own name, the logger will then be acting as an employee or agent of the grantor and will not be able to take advantag of the benefits of Section 631a.[7] An option to purchase by the seller will defeat the rights of the taxpayer holding the cutting rights to take capital gains benefits under 631a. Revenue Ruling 58-295 goes even further by stating that: "If the circumstances are such that the grantor in fact takes for his own use or for sale on his own account substantially all of the logs cut, whether or not in the exercise of a right in the form of an option to purchase, the taxpayer-grantee will not be deemed to have an unrestricted right to sell the logs or to use them in his trade or business.[8]

It is possible to draw up a contract which divides the ownership between the grantor and the grantee. In such a contract, care must be taken to be certain that the grantee has a definite say in the disposition of the logs.[9]

Firewood clause.—Under the election to make use of Section 631 (a), a taxpayer need not consider firewood cut for his household consumption as having been sold or exchanged upon the cutting there-

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[1] I. R. C. 1954, Section 1.631-1 (e).

[2] I. T. 3713, 1945 CB 178; Section 703, 1954 Code.

[3] I. R. C. 1954, Section 1.631-1 (d) (4). See Ah Pah Redwood, CA-9, 12/13/57 where the Court of Appeals ruled that taxpayer's purpose is irrelevant under 117 (k). Section 117 (k) is the forerunner of 631.

[4] I. R. C. 1954, Section 1.631-1 (a) (2).

[5] I. R. C. (1954, Section 1.631-1 (b) (2).

[6] Rev. Rul. 58-295, I. R. B. 1958-24, 15.

[7] Helga Carlen, 20TC 573 (1953), aff'd 220 F.2d 338 (9th Cir. 1955), and Ellison v. Frank, 245 F.2d 837 (9th Cir. 1957).

[8] See Light (*5*), where the following interesting sidelight was footnoted: Isaac S. Peebles, Jr., 5 T. C. 14 (1945) (although the cutting contract required the logger to sell to one of four named mills, he was the owner of the logs for tax purposes); L. D. Wilson, 26 T. C. 474 (1956) (the equitable title to the logs was sufficient for the cutter to take advantage of Section 117 (k) (2), even though the legal title remained in the grantor for security purposes).

[9] United States v. Johnson, 257 F.2d 530 (9th Cir. 1958) (owner of the timber retained a security interest in the logs and was required to purchase them, but the logger did not have to sell to the owner).

of.[10]

Computation of gain or loss under 631 (a).—The amount of gain or loss under 631 (a) shall be equal to the difference between the adjusted basis for depletion in the hands of the taxpayer at the time the timber is cut and its fair market value as of the first day of the taxable year in which the timber is cut.

The fair market value so determined shall be considered to be the cost of the timber for all purposes for which cost is a necessary factor.[11]

Section 631b, Internal Revenue Code, 1954.—Section 631b is the counterpart of Regulation 118, Section 117 (k) (2) in the 1943 amendments.

This section, 117 (k) (2), was added to the Code to give relief to taxpayers who leased their timberlands under contract in which they retained an economic interest. Under prior law, it was never completely settled as to whether income from such an arrangement was capital or ordinary income. Rowen (*7*) points out that the Service lost most of the cases where it argued that the taxpayer had sold the timber in the ordinary course of his business and that his gain was therefore ordinary income. He cites many cases to substantiate this statement. Section 117 (k) (2) clarified the treatment to be afforded taxpayers who leased their land, but retained an economic interest. Section 631b of the 1954 Code reads as follows:

> Disposal of Timber With a Retained Economic Interest.—In the case of the disposal of timber held for more than 6 months before such disposal, by the owner thereof under any form or type of contract by virtue of which such owner retains an economic interest in such timber, the difference between the amount realized from the disposal of such timber and the adjusted depletion basis thereof, shall be considered as though it were a gain or loss, as the case may be, on the sale of such timber. In determining the gross income, the adjusted gross income or the taxable income of the lessee, the deductions allowable with respect to rents and royalties shall be determined without regard to the provisions of this subsection. The date of disposal of such timber shall be deemed to be the date such timber is cut, but if payment is made to the owner under the contract before such timber is cut the owner may elect to treat the date of such payment as the date of disposal of such timber. For purposes of this subsection, the term "owner" means any person who owns an interest in such timber, including a sublessor and a holder of a contract to cut timber.

Dates applicable.—Under the Revenue Act of 1943, Congress made the provisions of 117 (k) (2) retroactive to March 1, 1913. However, Briggs (*3*) mentions the following qualifications:

> Only timber removed in 1942, 1943, or in subsequent years under a contract in which an economic interest is retained, can be treated as "property used in the trade or business" under Section 117 (k) (2). Therefore timber removed under such a contract in 1941 or a year prior thereto would receive capital gains and loss treatment provided under the Act applicable to the taxable year in which removed. By Section 127 (b) of the Revenue Act of 1943 timber disposed of under such a contract was included in the term "property used in the trade or business" beginning with January 1st, 1942.

This retroactive date and the qualifications attached thereto were undoubtedly intended to clear the docket of court cases which were backlogged on this very point of leased timber with a retained economic interest. This likewise helped to clarify the position of the Commissioner.

Holding period.—Under Section 631b the timber must be held for more than six months prior to disposal to qualify for capital gains or loss treatment. Bowen (*2*) raised an interesting possibility, "Where the requirements of a six-month holding period can be satisfied by tacking the holding period of a predecessor owner from whom the timber was acquired in a tax-free exchange,[12] it appears such tacking should be permitted. Section 631b refers to timber held rather than owned for more than six months, and this corresponds to another section of the Code which provides that the period for which the taxpayer has held property shall include the holding period of the predecessor (verified by new ruling, Rev. Rul. 55-352, I.R.B. 1955-23, 17).[13]

In computing the six-month holding period, the day of acquisition is not counted, but the day of disposal is counted. It should be noted that Section 631b requires a holding period of more than six months before the proceeds can be considered as derived from a sale or exchange, and therefore subject to the capital gains benefits of Section 1231.[14]

Determination of date of disposal.[15]—Under a Section 631b contract, the date of disposal is deemed to be the date such timber is cut. The date such timber is cut means the date when in the ordinary course of business the quantity of timber felled is first definitely determined.[16]

However, if payment is made to the owner under the contract, before such timber is cut, the owner may *elect* to treat the date of payment as the date of disposal of the timber. The election is solely for the purpose of determining the holding period and in no way affects the time for reporting gain or loss. If no election is made, amounts received prior to cutting will be considered as returns from the sale of timber, provided the timber paid for is cut more than six months after its date of acquisition. Where the election is made, and the prepayment is made six months or less from the date the timber disposed of was acquired, Section 631b does not apply to that payment regardless of the date the timber is cut since

[10] I. R. C. 1954, Section 1.631 (a) (4).

[11] I. R. C. 1954, Section 1.631-1 (d) (3).

[12] I. R. C. 1954, Section 1031. See also Rev. Bul. 58-295, 1958, Internal Revenue Bulletin No. 24.

[13] I. R. C. 1954, Section 1223.

[14] Prior to 1951, the date of disposal for timber was not clear. However, the Treasury Regulations considered it to be the date of the cutting contract. See also Springfield Plywood Corporation, CCH Dec. 17, 1946, 15 TC 697 (1950).

[15] I. R. C. 1954, Section 1.631-2 (b).

[16] Springfield Plywood Corporation, CCH Dec. 17,946, 15 TC 697.

the timber was not held more than six months prior to disposal.

The election shall be evidenced by a statement attached to the taxpayer's income tax return, on or before the due date, specifying the advance payments which are to be subject to the election and shall identify the contract under which the payments are made.[17]

If the contract right to cut timber expires or terminates before such timber is cut, the payments attributable to that timber shall be considered as ordinary income and not as from the sale of timber under Section 631b. Such payments are not subject to depletion.

At this point, it should be noted that Section 631 does not provide that income obtained under its provisions is subject to capital gains treatment, but merely that income obtained thereunder shall be treated as income from the "sale" of timber. Section 1231 I. R. C. 1954, determines the taxable character of such income.

Those eligible.—The provisions of Section 631b apply only to an owner of timber. However, the 1954 regulations define an owner as anyone owning an interest in timber, including a sublessor, and a holder of a contract right to cut timber. To qualify for Section 631b treatment, an owner must have an unrestricted right to sell timber on his own account or for use in his trade or business. The nature of the taxpayer's business or the purpose for which the timber was held has no bearing upon the treatment it receives under Section 631b.[18]

Economic interest.—An economic interest is possessed in every case in which the taxpayer has acquired, by investment, any interest in minerals in place or standing timber and secures, by any form of legal relationship, income derived from the severance and sale of the mineral or timber, to which he must look for a return of his capital. Mr. Briggs (*3*) gives three conditions under which he feels that an economic interest is retained:

1. Where he is paid so much per thousand or cord as the stumpage is cut.

2. Where he is paid so much out of the realization from the resale of the stumpage by his vendee.

3. Where he is paid so much out of the gross proceeds of the sale of products processed from the timber.[19]

Olson (*6*) has added a fourth condition:

4. Where a lease provides that at the expiration there must be returned to the lessor as much timber as when he entered into the lease.

It is important to those acquiring a contract right to cut timber that the contract in fact does grant them an economic interest. Bowen (*2*) comments on a partnership arrangement wherein it was ruled that an economic interest was not conveyed by the contract right to cut the timber.[20]

The assumption of risks such as growth, fire or other losses is frequently mentioned as being at least a partial determinant of whether an economic interest is retained. As far as can be determined, there is nothing available which sets forth the amount of risk which must be assumed or whether it actually creates an economic interest.[21]

There has been considerable discussion as to whether expenses of sale and current operating expenses are deductible from ordinary income or whether they should go to reduce the amount of capital gain where the capital gain benefits of 631(a) or (b) have been elected. The 1954 Code is not clear on this point. However, the position of the Commissioner appears to be that it should reduce the amount of the capital gain, but no legislative rules seem to spell out this interpretation. Revenue Ruling 58-266 states that "direct expenses" incured in disposal of coal or timber under Section 117 (k) (2), (forerunner of 631), are not deductible from ordinary income, but go to reduce the amount of the capital gain. Paul A. Teschner (*9*) takes the Commissioner to task for what he considers over-stepping of authority, and states that income tax rule-making is supposedly the jurisdiction of Congress. Teschner's article "Expense of Sale; Law-Making by the Commissioner," in *Taxes* magazine, August 1957, gives an excellent background coverage of this problem. Whitaker (*10*) likewise feels that there is no legislative basis for denying a deduction under the 1954 Code for all current operating expenses.

The advent of the pulping industry brought about an economic market for small sizes of wood which hitherto had not had a ready market. Thinnings, in many cases, became an economic asset. The large amount of wood previously left in the woods as tops from sawtimber cutting or from the removal of timber as poles or piling at last had financial value. The steady increase in the demand for pulpwood, the gradual increase in its price, and the technological advances made in harvesting it have now made it a desirable product.

The tax consequences of money received from the harvesting of this asset have become of interest to owners and harvesters alike. The position of the Internal Revenue Service in regard to tops and limbs converted into pulpwood is fairly clear. Revenue Ruling 56-434 states that income from the sale of tops and limbs will not qualify for

[17] I. R. C. 1954, Section 1.631-2 (e)(1).

[18] Ah Pah Redwood Co., 26 TC No. 149, CCH Tax Ct. Rep. Dec. 21, 952 (1956). See also Rev. Rul. 57-90.

[19] Boeing v. U. S., 98 Fed. Supp. 581.

[20] John S. Pankratz, CCH Dec. 20, 579, 22 TC 1298 (1954). A partnership leased timberlands with cutting rights as the sole asset, and later entered into a contract with a third party granting the third party the right to remove and cut the timber. Such a right to reassign by third party was nontransferrable without partnership consent to receive money as the timber was cut. The agreement was transferred later to a fourth party, stating that the partnership gave up all rights, title, and interests in the original lease to the fourth party. The partnership claimed capital gain on sums paid to them by the fourth party when the timber was cut.

The court declared that the 1943 Section 117 (k) (2) did not apply; therefore amounts received were not capital gains. It stated that the lease had not been assigned to a fourth party in a realistic sense, the right to cut, use, and market the timber had previously been assigned to a third party; all that was left to the partnership was the right to receive proceeds in terms of money only. There was no economic interest, so the holding would be the same for the 1954 Code.

[21] Olson (*6*) discusses fire risk and its effect on a retained economic interest.

capital gains under Section 631 (b) because the word *timber* in the section specifically refers to standing trees only. However, in a Section 631 (a) sale there is no reason why a portion of the fair market value could not be determined as derived from the anticipated sale of the tops or limbs for pulpwood. The fair market value so determined will not be the sawtimber value plus the proceeds received from the sale of the pulpwood, but will of necessity be the value of the gross income minus pulpwood's fair share of all operating expenses up to the stage where it is ready to be hauled to the mill. By allocating part of the cost to the tops, the gain has been increased on the sawtimber and reduced on the tops, thereby creating a tax advantage. Whitaker[22] sees no reason why an owner could not dispose of standing timber under a pay-as-cut contract where the compensation would be based not only on logs as delivered to the mill, but on cords of pulpwood from the tops and limbs sold to a paper mill and obtain the benefits of Section 631 (b). He carries his reasoning a little further and suggests that there is no reason why the holder of the contract could not himself contract out the salvaging of tops and limbs obtained from the timber he has under contract. He likewise raises the hypothesis that if the tops and limbs were sold outright as a lump sum cash transaction the owner might conceivably have a basis for capital gains treatment under Section 1221, if he were careful to show that they were not primarily held for sale to customers.

Chips present somewhat of a problem. Under Section 631 (b) they can hardly be classified as "timber." Chips are definitely a byproduct of a manufacturing process and actually require special equipment to be produced. However, by reference again to Revenue Ruling 56-434, there seems to be no apparent reason why a share of the fair market value cannot be accounted for by the value of chippable material. If we could add the value of chippable material to the other values of a tree such as its value for lumber and its value for pulpwood, it could conceivably raise the value of the standing tree. Capital gains or losses occur when an individual sells for a profit or a loss something which is being retained as a source of income. The tree is the machine which produces the wood which brings in the income. Therefore, carrying this analogy further, the gain in value of the tree by virtue of its having chippable material in it, is a capital gain. The proper way to tax it is another question.

Christmas trees have been brought under the capital gains provisions as provided under Section 631 (b). The Treasury Regulations state:

> For purposes of section 631(b) and this section, the term *timber* includes evergreen trees which are more than 6 years old at the time severed from their roots and are sold for ornamental purposes such as Christmas decorations. Tops and other parts of standing timber are not considered as evergreen trees within the meaning of section 631(b). The term *evergreen trees* is used in its commonly accepted sense and includes pine, spruce, fir, hemlock, cedar and other coniferous trees.

A lease of turpentine rights on standing timber is a disposal of timber within the meaning of 117 (k) (2) (forerunner of Section 631(b) and the lessor is eligible for capital gains provisions according to a federal district court decision. The reasoning behind the decision is vague and it is suggested that the decision as issued by the court be read by any interested party.[23]

Leases.—It seems fairly evident, that Congress never envisioned the many ramifications of the long-term timber leases now being drawn up when it passed the present Internal Revenue Code. The leases referred to are ones in which the owner grants to a company, or timber operator, the right to cut an amount each year equivalent to the annual growth, for a specified number of years, in return for a fixed annual sum of money plus the payment of real estate taxes, insurance, and fire protection costs on the property.

Sanders cites a case docketed in the U. S. Tax Court (October 1958) where the Internal Revenue Service contended that payments to the lessor in terms of "an annual rental of $1.75 per acre upon 2414.49 acres" with the right to remove a minimum of 2,100 cords annually were ordinary gains instead of capital gains involving a disposal with a retained economic interest.[24]

Sanders (*8*) further cites a decision in the Georgia Court of Appeals where it was held that income under a long-term lease in which the lesser had a retained economic interest under Section 117 (k) (2) is ordinary income under the state income tax law rather than capital gains. The case was appealed to the Supreme Court.[25]

In Joe S. Ray v. Commissioner, the tax court held that a timberland owner's contract to cut and deliver, at current market prices, a large quantity of pulpwood and to allow the buyer to enter his land and cut timber in the event of a default, did not constitute a "disposal" of timber within the meaning of Section 117 (k) (2) (forerunner of 631b). The reasoning of the tax court seems to be that Congress intended the benefits of 117 (k) (2) to be limited to those owners who contracted out their cutting rights, but retained an economic interest in the timber (*1*)

Whitaker (*10*) brings to attention many problems dealing with long-term timber leases and if you are interested in this type of leasing arrangement, his thoughts

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[22]Whitaker (*10*) has excellent sections dealing with the sale or consumption of tops, limbs, stumps, and chips.

[23]Brown Wood Preserving Company and Ray E. Loper Lumber Company, Plaintiffs, versus the U.S., Civil Actions Nos. 3290-91, U. S. District Court, Western Division, Kentucky, May 27, 1958.

[24]Estate of James M. Lawton, Deceased, U. S. Tax Court, Docket No. 68,444. Perhaps the trouble might be avoided if the annual payments were related to the actual cords cut during the year.

[25]Williams v. Superior Pine Products Co., Georgia Court of Appeals, March 10, 1958.

merit consideration. While he is unable to arrive at any sure-fire method for writing a lease which will be certain to qualify for capital gains treatment, he does hit at the heart of the matter. That is, why should an owner be denied the tax benefits of capital gains just because he farms out some of the management responsibility or economic risk? If he did his own logging, or contracted it out, he could undoubtedly qualify for capital gains treatment. Why then should he be denied it under the long-term leasing arrangement?

In summary it should be pointed out that in almost every case where a taxpayer avails himself of the tax provisions of Section 631 he enjoys benefits which would not accrue if his timber income were taxed as ordinary income. To come within the province of Section 631 (a):

1. He must have owned the timber or have had a contract right to cut the timber for more than 6 months prior to the first day of the taxable year in which it is cut.

2. He must cut the timber for sale or use in his trade or business.

3. He must elect the election upon his return.

To come within the province of Section 631 (b):

1. He must own the timber for more than six months prior to its disposal.

2. He must dispose of the timber by means of a contract which retains for him an economic interest.

By careful consideration of the foregoing requirements the taxpayer can assure himself of capital gains treatment of income from the sale or exchange of timber. While other avenues are open for capital gains treatment of timber income, Section 631 offers the widest possibilities for receiving these tax benefits.

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Division of Silviculture Amended Call for Annual Meeting Papers

The 1961 Annual Meeting of the Society of American Foresters will include a Technical Session on Silviculture to be held on Wednesday, October 11, in Minneapolis, Minn. There will be morning and afternoon sessions held jointly with members of the Canadian Institute of Forestry having similar interests.

Correspondence relating to the Technical Sessions on Silviculture should be addressed to Paul O. Rudolf, chairman, SAF Division of Silviculture, Lake States Forest Experiment Station, St. Paul Campus, University of Minnesota, St. Paul 1, Minn. Society members wishing to present papers should submit, in triplicate, the following information: (1) title, (2) short abstract, (3) name and address of the author, (4) name and address of the organization represented, (5) time required for presentation, and (6) type of projection equipment required. To be considered, this information must be received before May 15, 1961.

The SAF portion of the program will be made up by the executive committee of the Division of Silviculture by selecting papers from proposals submitted. Presentations requiring 15 minutes or less are favored, and none will be considered that require more than 20 minutes.

Although no specific program theme has been established, preference will be given to papers concerning natural or artificial regeneration of cutover or burned over forest lands.

Authors of selected papers will be notified by June 15.

WALTER L. BEERS, JR.

Secretary, SAF Division of Silviculture,
The Buckeye Cellulose Corporation,
Foley, Fla.

Oak and Pine Reproduction Responds to Overhead Release

Kenneth A. Brinkman and Franklin G. Liming

NATURAL succession in the second growth upland forests of the Missouri Ozarks is toward better composition, but the process is slow. So in order to increase the productivity of these forests faster, ways must be found to speed up this natural succession. Releasing the more desirable trees in the reproduction by some combination of harvest cutting, girdling of low-quality trees, and use of herbicides might be the solution.

The Central States Forest Experiment Station, in cooperation with the Clark and Mark Twain National Forests, started a series of studies in 1938 to test the effects of different degrees of overhead release, by several methods applied in different seasons, on advanced hardwood and pine reproduction and on planted shortleaf pine. The results of two of these studies are reported here.

The Study Areas

The studies were made on the Mark Twain and Clark National Forests on dry, gentle-to-moderate, upper slopes that once supported good stands of pine. The Mark Twain tract is in Howell County, near Willow Springs; the Clark tract is about 50 miles away in Reynolds County near Bunker, Missouri. The soil is medium-cherty Clarksville loam derived from impure limestone.

Before treatment, stocking on the two areas was very similar and rather typical of upland forests in the Ozarks at the time (Fig. 1). The overstory stand was about 40 years old and contained about 390 trees per acre at least 1 inch in diameter. These averaged 33 feet in height and 5.7 inches in diameter at breast height. Total basal area averaged about 79 square feet per acre. About one-fourth of the trees were of the more desirable species — shortleaf pine (*Pinus echinata* Mill.), white oak (*Quercus alba* L.), and black oak (*Q. velutina* Lam.). Nearly all the rest of the trees were low-value species such as blackjack oak (*Q. marilandica* Muenchh.), post oak (*Q. stellata* Wangenh.), and hickory (*Carya* Nutt.). A few blackgum (*Nyssa sylvatica* Marsh.), sumac (*Rhus* L.), and sassafras (*Sassafras albidum* [Nutt.] Nees) also were present.

The original stands contained about 3,500 reproduction-size trees per acre. Natural shortleaf pine reproduction was considered inadequate for full production, so 1-0 shortleaf pine seedlings were planted on the Clark area in the fall of 1936 and on the Mark Twain area in the spring of 1938. When the studies began, pine seedlings accounted for 3 percent of all reproduction, pine sprouts for less than 1 percent, and planted pine for about 14 percent (Table 1). Only 6 percent of the reproduction was white oak or black oak, and 60 percent was post oak or blackjack oak.

About 98 percent of the hardwood reproduction was sprouts that had developed during the 5 years since the last fires. The sprouts were 3 to 5 years old and from 1 to 3 feet tall. The hardwood seedlings not only were a very small part of the reproduction, but they averaged less than ½ foot tall.

Treatments

On the Clark area treatments consisted of four *degrees* and three

FIG. 1.—Overstory trees are defective, slow-growing, and incapable of producing a worthwhile crop, yet they prevent good growth of understory reproduction of pine and sprout hardwoods.

THE AUTHORS are research forester and former research center leader, respectively, Columbia Forest Research Center, Central States Forest Expt. Sta., Forest Service, U. S. Dept. Agric., maintained in cooperation with the University of Missouri Agric. Expt. Sta., Columbia.

Dr. Liming is now with the Division of Forest Management Research, Forest Service, Washington, D. C.

TABLE 1.—AVERAGE STOCKING OF REPRODUCTION-SIZED TREES AND PERCENT OF TOTAL STOCKING IN 1938, BY SPECIES AND ORIGIN

Species	Origin	Trees per acre	Percent of total stocking
Pine	Seedling	124	3.0
	Sprout	25	0.6
	Planted	565	13.7
	All	714	17.3
White oak	Seedling	2	0.0
	Sprout	99	2.4
	All	101	2.4
Black oak	Seedling	5	0.1
	Sprout	139	3.4
	All	144	3.5
Post oak	Seedling	3	0.1
	Sprout	1,443	34.9
	All	1,446	35.0
Blackjack oak	Seedling	23	0.6
	Sprout	1,027	24.8
	All	1,050	25.4
Hickory	Seedling	6	0.1
	Sprout	190	4.6
	All	196	4.7
Blackgum	Seedling	1	0.0
	Sprout	103	2.5
	All	104	2.5
Sumac-Sassafras	Seedling	25	0.6
	Sprout	353	8.5
	All	378	9.1
All hardwoods	Seedling	65	1.5
	Sprout	3,354	81.2
	All	3,419	82.7
All species	Seedling	189	4.5
	Sprout	3,379	81.8
	Planted	565	13.7
Total		4,133	100.0

TABLE 2.—SURVIVAL OF REPRODUCTION 11 YEARS AFTER RELEASE, BY RESIDUAL BASAL AREA OF OVERSTORY TREES AND SPECIES (METHODS AND SEASONS OF RELEASE AND ORIGIN WERE COMBINED EXCEPT AS INDICATED)

Species and origin	Overstory basal area in square feet			
	0	27	53	79
	Survival of original trees			
	Percent			
Pine				
Delayed release by cutting				
Seedlings and sprouts	21	75	43	57
Planted	10	78	92	74
All	13	77	78	72
All other releases combined				
Seedlings and sprouts	57	74	56	62
Planted	78	86	83	72
All	75	82	75	69
All pine				
Seedlings and sprouts	53	74	52	61
Planted	74	83	86	72
All	71	81	76	70
White and black oak	90	71	77	77
Post oak, hickory, and blackgum	78	73	73	62
Blackjack oak, sumac, and sassafras	69	62	56	44
All hardwoods				
Seedlings	32	67	36	20
Sprouts	77	69	67	54
All	75	69	66	54
All species				
Seedlings	40	71	45	40
Sprouts	77	69	67	54
Planted pine	74	83	86	72
All	74	70	67	56

methods of eliminating the hardwood overstory.

Degrees of release were:

1. Check, no release. Leave 79 square feet basal area.
2. One-third release. Leave 54 square feet basal area. On many areas this is comparable to removing cull and weed trees and a few merchantable trees.
3. Two-thirds release. Leave 27 square feet basal area. In many stands this is comparable to removing the cull and weed trees and most of the merchantable trees.
4. Complete release. Leave no basal area.

Methods of release were (1) cut, (2) notch (deep) girdle, and (3) peel (shallow) girdle.

On the Mark Twain area treatments consisted of four methods of understory release in three seasons of the year. Methods were as on the Clark area plus a check and seasons of the year were:

1. Early March before growth started.
2. May during the active growing season.
3. August during the late growing season.

Neither method nor season of release had any significant effect on the results.

On both areas the plots were square and 0.1 acre in size, with a 33-foot-wide isolation strip treated the same as the plot. Evaluation of the effects of treatment was based on measurements of survival and growth of about 10,000 trees which were marked with numbered tags on wire stakes. Observations were made (1) at the beginning of the studies in the spring of 1938, (2) annually at the end of the growing season for 3 years, and (3) at the end of the eleventh year.

Results

The understory trees of all species benefited from the release provided by removal of overstory trees regardless of the method, season, or degree of making the release. With only one exception, survival of all species was increased by release but there were no great differences among the different methods, seasons, and degrees of release. The exception was an increased mortality of pine because release by

clearcutting was delayed one year after planting.

The most obvious result of release was that the growth rate of trees of all species consistently increased with amount of overstory reduction. Although the composition of the reproduction as a whole was not greatly changed, the faster growth of the better species resulted in a great improvement in composition when only the best 500 trees per acre were considered.

Survival

The increase in survival of the reproduction (except pine released a year after planting) was essentially the same for all methods and seasons of release. Consequently the hardwood survival data are combined for the different methods and seasons of release. Moreover, because of the small number of hardwood seedlings, the data for sprouts and seedlings of all hardwood species also were combined.

For the reproduction as a whole, survival was related directly to extent of overstory removal and ranged from 56 percent without release to 74 percent where all overstory trees were killed or cut (Table 2). This relation existed because hardwoods predominated; survival of pine was not greatly increased by release. Post, black, and blackjack oak, comprising nearly two-thirds of the total stocking, benefited most by overstory reduction.

Height Growth of All Reproduction

All types of releases resulted in an increase in the growth rate of all reproduction.

Growth rate independent of method or season of release.—After 11 years, heights of released reproduction were essentially the same whether the overstory was cut or girdled. First-year growth response for planted pines was greater following clearcutting than under a girdled overstory, but by the end of the third or fourth growing season, there was no apparent difference in favor of cutting.[1] The early advantages of immediate release provided by cutting apparently were offset by the later beneficial effect of the partial shade of girdled trees.

As Liming reported in 1946,[1] delaying the release of planted pine from March into May and August of the first growing season somewhat retarded early height growth. The difference still persisted but was not great enough to be significant at the end of the 11-year period.

Since there were no great differences in the growth rates due to different methods and seasons of release, these data were combined in this report.

Growth rate related to degree of release.—The degree of release or the amount of overstory left had a very pronounced effect on the the height growth rate of the re-

[1]Liming, Franklin G. Response of planted shortleaf pine to overhead release. Cent. States Forest Expt. Sta. Tech. Paper 105. 20 pp. Illus. 1946.

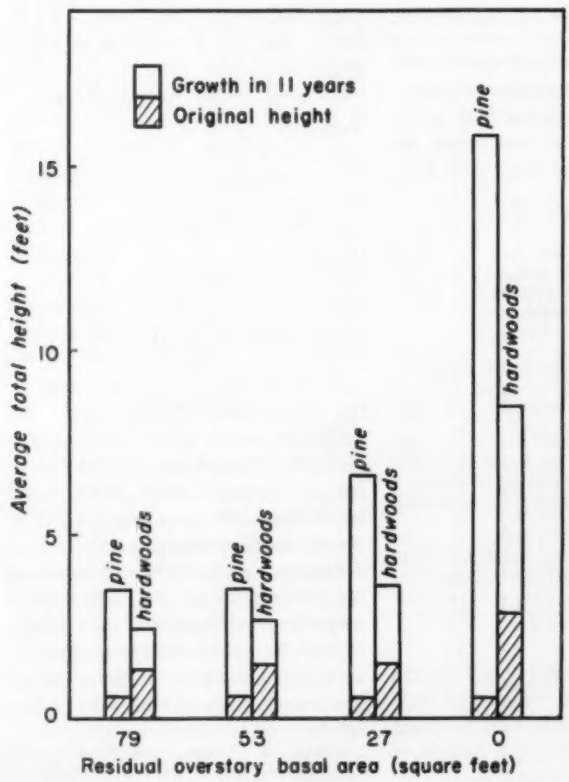

FIG. 2.—Original height and 11 years' height growth of hardwood and pine reproduction under different overstory densities.

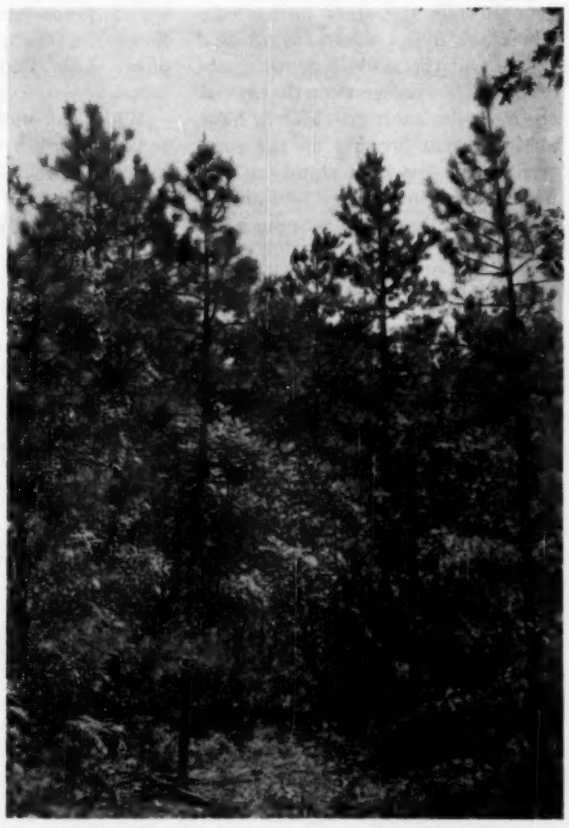

FIG. 3.—Shortleaf pine trees completely released when planted respond best and dominate the stand after 11 years (compare with Fig. 1).

production. Growth increased at an increasing rate with degree of release (Fig. 2). Reproduction grew slowly under an overstory with 79 square feet basal area. Removing about one-third of the overstory increased height growth only slightly but removing two-thirds of the overstory basal area doubled the growth rate of the reproduction (Table 3). And where all the overstory was removed, the growth rate was five times that of unreleased reproduction.

In other words, reducing the overstory basal area from 27 to 0 square feet brought about more than twice as much increase in height growth as reducing the basal area from 79 to 27 square feet. This may prove to be a point in favor of even-aged management in such stands.

Height growth rate varied with species.—The more desirable species generally grew faster than the rest (Table 3, Fig. 3). Pine grew faster than any other species; white and black oak made better height growth than the other hardwoods. Blackjack oak, sumac, and sassafras had the slowest growth rate of all. This better growth rate of the more desirable species will have an important bearing on the composition of the final stand, as will be discussed in a later section describing the best 500 trees per acre.

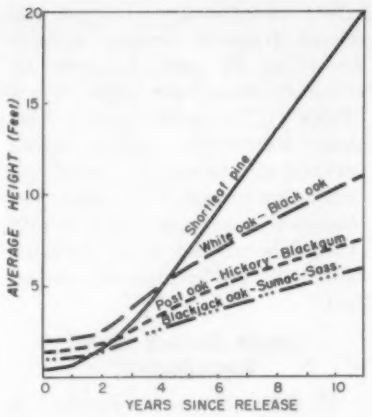

FIG. 4.—Average total heights of all trees. Shortleaf pine responded more to complete release than any other species. White and black oaks grew much faster than the other hardwoods.

Even though the hardwoods were taller than the pine when the study was started, the accelerated growth of the completely released pine enabled this species to overtake the taller hardwoods in a few years and become dominant in the stand (Figs. 3 and 4). This occurred to a lesser degree on the partially released areas and so it will take longer for the pine to reach dominance here than in the clearcut stand.

White oak consistently grew faster than any other hardwoods under all conditions. Under a full overstory black oak did not grow as fast as hickory and blackgum but, when partially released, outgrew all other hardwoods except white oak. Because release increased the growth rate of the desirable species more than the others, release speeded up natural succession which is toward better composition.

Growth of hardwoods related to original height and origin.—On areas given the same overstory treatment, there was a highly significant correlation between the original and final heights of hardwood reproduction. In both released and unreleased stands, the tallest hardwoods at the end of the study were sprouts that had an initial height advantage. At the start of the study, the hardwood seedlings were about ½ foot tall, whereas the sprouts were 3 to 5 feet tall. Although the seedlings responded well to release, they seldom grew fast enough to overtake the taller sprouts.

TABLE 3.—HEIGHT GROWTH OF REPRODUCTION DURING THE 11-YEAR STUDY PERIOD, BY AMOUNTS OF OVERSTORY BASAL AREA AND SPECIES (EXCEPT WHERE NOTED, DATA FOR METHODS AND SEASONS OF RELEASE AND ORIGIN WERE COMBINED)

Species and origin	Overstory basal area in square feet: 0	27	54	79
	Height growth			
	Feet			
All pine				
Seedlings	10.2	4.3	1.9	1.5
Sprouts (only 25 trees/A)	14.5	17.8	—	4.3
Planted	17.1	8.5	4.3	3.5
All	15.0	6.2	3.1	3.1
White and black oak	8.5	4.1	2.4	2.1
Post oak, hickory, and blackgum	6.2	2.1	1.3	1.1
Blackjack oak, sumac and sassafras	4.6	1.5	0.7	0.7
All hardwoods				
Seedlings (only 65 trees/A)	2.4	1.2	0.3	0.4
Sprouts	5.7	2.1	1.3	1.0
All	5.7	2.1	1.3	1.0
All species				
Seedlings	8.8	1.2	1.6	1.3
Sprouts	5.7	2.1	1.3	1.0
Planted pine	17.1	8.5	4.3	3.5
All	7.7	2.9	1.6	1.5

Predicting Future Composition

Clark and Liming[2] noted a natural tendency for quality of composition to improve in the Ozarks even without treatment. They found that the proportion of more desirable species such as pine and black and white oak, increased 6 to 8 percent during a 17-year period regardless of the overstory left. Complete release accelerated the trend toward better composition. The real influence of release treatments on the future composition and quality of stands often is obscured, however, by such overall averages of height and species distribution. For example, of the more than 3,000 trees per acre in the understory at the end of the study, relatively few will survive to maturity. So a better indication of future composition is provided by the tallest 500 trees per acre than by the understory as a whole.

Overstory reduction increased height growth of the taller trees more than of the stand as a whole. Completely released trees grew 3.5 to 4 times as much as those on the untreated areas, with the pines

[2]Clark, F. Bryan, and Franklin G. Liming. Low-grade hardwood stands in the Missouri Ozarks respond to stand improvement. Jour. Forestry 55: 354-358. Illus. 1957.

taking advantage of the increased growing space more promptly than the hardwoods (Fig. 5). Even though they were several feet shorter than the tallest hardwoods at the start, the pines grew fast enough to overtake all the hardwoods within 6 to 8 years where at least two-thirds of the overstory was removed. When 53 or more square feet were left per acre, however, the pines still were no taller than most hardwoods after 11 years.

After 11 years, 77 percent of the tallest trees in clearcut stands were pine and 86 percent either pine, black or white oak, as compared with only 40 percent pine and 59 percent pine or black or white oak on the unreleased areas (Table 4). Where the overstory basal area was reduced to 27 square feet per acre, 57 percent of the tallest trees were pine, and 82 percent either pine or desirable oaks. With little or no release, however, the less desirable and more numerous species such as post and blackjack oak constituted at least 40 percent of the tallest trees in the understory stand.

Even without release, the faster rate of growth for pine probably would have enabled some individuals to overtop the hardwoods, but the quality of stocking in such stands will not be as good as where prompt, complete release is given.

As a result of adequate release then, composition improved because pine, white oak, and black oak grew enough faster than the other species to become dominants in the young stand.

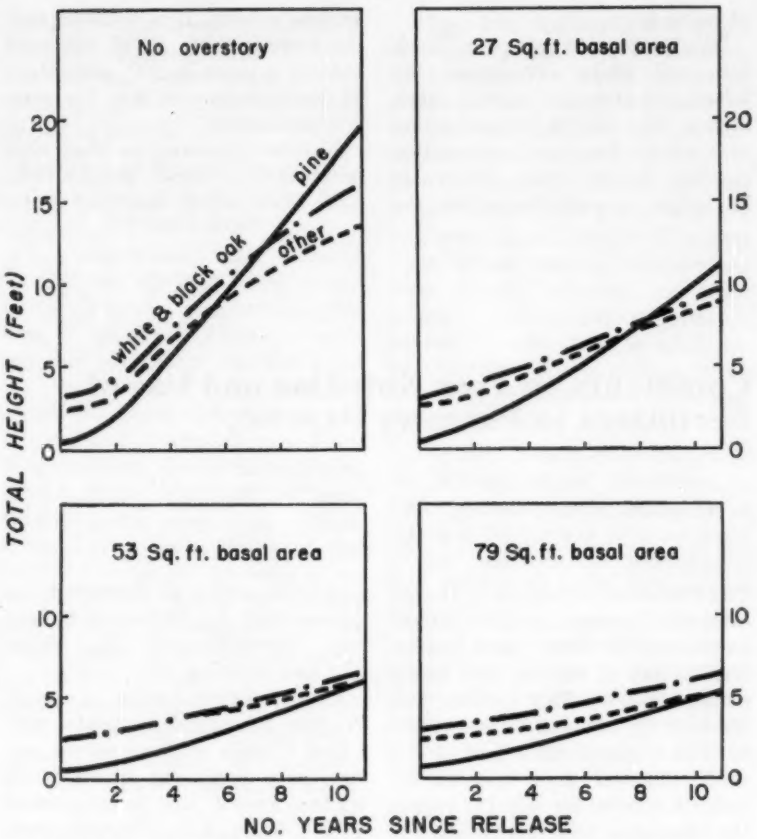

FIG. 5.—Average total heights of tallest 500 trees per acre by residual basal area, species groups, and years since release. Growth was inversely related to overstory basal area per acre.

TABLE 4.—COMPOSITION OF ALL REPRODUCTION AT BEGINNING AND END OF STUDY AND OF TALLEST 500 TREES PER ACRE AT END OF STUDY, BY DEGREE OF RELEASE

Species	All trees		Tallest trees
	Start	End	End
	NO OVERSTORY		
Pine	20.5	21.7	77.4
White oak, black oak	4.8	5.6	8.6
Post oak, hickory, blackgum	41.4	39.0	10.1
Blackjack oak, sumac, sassafras	33.3	33.7	3.9
	27 SQUARE FEET		
Pine	11.7	18.7	57.2
White oak, black oak	6.8	7.4	24.4
Post oak, hickory, blackgum	51.2	45.9	12.8
Blackjack oak, sumac, sassafras	30.3	28.0	5.6
	53 SQUARE FEET		
Pine	12.8	19.8	37.2
White oak, black oak	7.8	8.8	22.7
Post oak, hickory, blackgum	43.9	42.1	30.7
Blackjack oak, sumac, sassafras	35.5	29.3	9.4
	79 SQUARE FEET		
Pine	17.1	22.2	40.4
White oak, black oak	5.3	7.4	18.6
Post oak, hickory, blackgum	37.9	39.5	33.4
Blackjack oak, sumac, sassafras	39.7	30.9	7.6

Summary

Many pine sites in the Missouri Ozarks now support stands of poor-quality oaks and scattered pine. The reproduction under these stands often includes pine seedlings as well as sprouts of desirable oak species, but these grow very slowly. In 1938, studies were begun to test several methods of releasing this reproduction and planted pine as a means of improving composition and increasing growth. About 10,000 numbered trees were measured periodically for 11 years.

Survival of reproduction generally was increased but was not well correlated with degree of release except for post, blackjack, and black oaks. Season and method of release had very little effect on survival except that delayed release by clearcutting seriously reduced survival of planted pine.

Height growth of reproduction of all trees increased as overstory decreased. The rate was about the same for all methods and seasons

of release.

The proportion of pine, black oak, and white oak among the *tallest 500* trees per acre is much higher than for the reproduction as a whole. Improved composition resulted largely from differences in height growth rates for the various species. It is believed that the merchantable stand also will contain a much higher percentage of desirable species than the present understory.

Natural succession on these sites is toward a better composition; more pine, black oak, and white oak; less post and blackjack oak, and hickory. A significant reduction of overstory competition speeds up this natural succession. The more complete the release given, the higher the proportion of desirable trees among the tallest 500 trees per acre.

Comments on Tree Nutrition and Use of Fertilizers in Forestry Practice[1]

S. A. Wilde

THE POST-WAR period has witnessed intensified research on nutrient requirements of forest trees and on fertilization of nursery and forest plantation soils. This activity was induced by two conditions developed in a considerable part of the world. One of them was an increased demand for wood to repair the damages and replenish the shortages caused by the war. The other was an attempt to stimulate growth of plantations and second growth stands which occupy nutrient-depleted soils. Such stands often fail to produce an increment sufficient to cover the interest on the investment and the expenses on taxes and upkeep.

Governmental agencies, private wood-producing concerns, and the fertilizer industry have contributed generously to the studies of forest soil fertility and its effect on tree growth. In the last fifteen years, over 2,000 papers were published on the subject in the United States, England, Germany, Russia, Czechoslovakia, Japan, and Scandinavian countries. A part of this enormous output of literature was summarized by White and Leaf (*6*), Mayer-Krapoll (*3*), Wilde (7) and Brüning (*1*).

Unfortunately, only a small fraction of published papers provided reliable evidence of an economically significant improvement of tree growth due to application of fertilizers. A considerable number of reports denied the beneficial effect of fertilizers and some even stressed their harmful influence. Many papers which show the success of fertilizer treatments were based on questionable observations of very small plots or individual trees, trees younger than five years, and the use of impracticable methods, such as repeated applications of top dressings or fertilizer solutions. In some instances, the results achieved with plantations only a few years old were supplemented by wholly fantastic, pseudo-mathematical calculations of the financial gains that should result from fertilizer treatments (*4*). Still another fraction of papers reported results of fertilizer trials which have been long known to a good many nursery foremen.

This seemingly incomprehensible picture is the outcome of the past history of forestry with its "soilless" silviculture and "mathematical" forest management. In consequence, most of the fertilizer trials had been conducted either by foresters who lacked the basic information on soils and plant nutrition, or by soil specialists and botanists who had little knowledge of forestry. This paper is written with the hope of eliminating some of the existing misapprehensions and advancing the effective use of fertilizers in forestry practice.

To obtain a better insight into the problem of tree nutrition and fertilizer requirements of forest soils, it is desirable to review under separate headings the nutrition of nursery stock and the nutrition of forest stands. Although the growth of these two types of plant culture is governed by the same basic laws, they differ radically in their quantitative demands for nutrients and in the drain which they exert on soil fertility.

Nutrition of Nursery Stock and Maintenance of Nursery Soil Fertility

The nutrition of nursery seedlings is far less complicated and much better understood than that of trees growing at a wide spacing. In a way, the production of nursery stock is similar to the production of field or truck garden crops; both of these endeavors represent mining operations in which the plants are used as the tool for the extraction of nutrients from their natural deposits. However, this analogy is not complete, for the production of nursery stock possesses some specific peculiarities.

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[1]Contribution from Soils Department, University of Wisconsin, with financial support and cooperation from the Wisconsin Conservation Department. Publication approved by the director of the Wisconsin Agricultural Experiment Station. Some information presented in this paper is taken from unpublished records of fertilizer trials conducted by H. H. Krause and R. C. Dosen.

The bulk of roots of tree seedlings seldom exceeds the length of 12 inches, and hence the feeding of this crop takes place in the extremely shallow surface layer of the soil. With the growing stock varying between one and two million plants per acre, this topsoil layer is literally packed with roots and rhizomycelia. The dense network of feeding organs, together with artificial irrigation, exerts a nutrient drain greatly exceeding that caused by farm crops. In farming practice, 600 to 700 pounds per acre of 6-12-12 fertilizer is considered to be a heavy treatment. The nursery soil manager, using highly concentrated synthetic salts, often applies an equivalent of 3,000 to 4,000 pounds per acre of such a fertilizer to bring his crop to a plantable size.

Whatever the composition of the nursery soil, there is no mystery in regard to the nutrient drain exerted by the growth of tree seedlings. We know the exact weight of the produced crop, as well as the seedlings' content of nutrient elements, and we can determine the losses of nutrients through leaching and biological fixations. Thus, if a crop of three-year-old red pine seedlings, analyzing about one percent of nitrogen, weighs 12 tons per acre, the soil is deprived of 240 pounds of this element. Therefore, to retain the basic capital of soil fertility, we must add at least 1,200 pounds of 20 percent ammonium sulfate plus another 500 to 800 pounds of the same fertilizer to balance the losses by leaching and cellulolytic activity. And the same is true in different degrees in regard to other nutrients—phosphorus, potassium, calcium, magnesium, and trace elements (*8*).

In a large measure, the solution of problems related to fertility is facilitated by the nature of nurseries. In many instances, the level topography, the soil homogenized by rototilling, rigidly regulated contents of moisture and nutrients, and millions of test plants present ideal ground for research in plant nutrition. The recent analyses of lysimetric leachates, soils, and stock tissues by Krause (*2*) provided a comprehensive account of the fate of applied fertilizers, their loss, and their consumption by pine seedlings during their three-year period of growth.

Nutrition of Forest Stands and Correction of Deficiencies in Forested Soils

In comparison with nursery stock, forest stands present an entirely different quantitative picture of nutrition. Trees in woodlots and plantations usually number less than 2,000 per acre, or about one-thousandth of the population found in nursery beds. Each tree, therefore, derives its nutrients from a large volume of soil comprising many cubic feet. Aside from this, a large share of the nutrients extracted by trees is returned by leaf fall to the ground and, after mineralization of the litter, enters the cycle of the rotating fertility of forest soils. In the undisturbed forest stands, this provision of nature maintains indefinitely the supply of available nutrients and sometimes augments the level of forest soil fertility. In well-managed forest stands, the removal of timber eliminates but a small fraction of soil nutrients because more than 95 percent of nitrogen and ash constituents are in the foliage and young branches that remain on the ground. The small loss of nutrient elements caused by a rational logging, therefore, is soon recovered by progressive weathering, electric discharges, precipitation, dust storms, and biotic agents.

Forest stands also possess a much greater capacity to utilize nutrients from raw organic remains and unweathered minerals than do nursery seedlings or field crops. This capacity is due to several conditions: (1) the deep penetration and the large total length of root systems measuring in some mature trees several hundred miles; (2) the symbiotic association of trees with mycorrhizal fungi which provides an efficient mechanism for extracting nutrients; and (3) the chelating effect of root sloughings supplementing the activity of mycorrhizal fungi in the liberaiton of available nutrients from difficultly soluble sources.

These are the conditions which restrict the need for application of fertilizers in forest stands to soils that have either an inherent or acquired deficiency of some essential nutrients. Within the region of temperate climate, the possibility of such deficiencies is largely limited to soils depleted by previous agricultural use, soils derived from purely siliceous or other nutrient-deficient parent material, substrata exposed by erosion, severely burned-over podzols, soils covered with inert raw humus, and some peat soils.

The first reason, therefore, why the application of fertilizers in many previous trials has failed to increase the growth of trees rests in the fact that the treated soil had an entirely sufficient content of nutrients.

In a way, soil fertility is comparable to a finely adjusted machine. The presence of all the essential major and minor nutrient elements in sufficient amounts is just as necessary for the satisfactory growth of plants as the presence of the smallest screw or spring is essential for the performance of a motor. In many instances, therefore, the failure of fertilizer treatments was caused by an oversight of a deficiency of certain major or minor nutrient elements. This outcome is nearly unavoidable when the trials are confined to the N-P-K "agricultural triad" and are initiated without an attempt to reveal the state of soil fertility by analyses.

On soils of low fertility level, a heavy application of fertilizers, especially ammonium and potassium salts, may cause a depressed growth or even a complete deterioration of forest stands because the applied nutrients, through exchange reactions, deplete the supply of some other essential nutrient element, for example, magnesium (*5*).

The effect of the applied fertilizers is intimately dependent on the supply of soil moisture resulting from the conditions of climate, water-retaining capacity of the soil, and the position of the ground water level. As reported by many investigators, forest stands on soils

underlain by ground water at a depth accessible to roots (either directly or through an extended capillary fringe) are especially responsive to fertilizer treatments. This is true even of moss peat, and some other organic soils with an extremely high water table. Contrariwise, a fertilizer treatment of a coarse, sandy soil in a continental climate would be of no benefit to trees of high moisture requirements, for example, Norway spruce. Under such conditions, the growth of trees is arrested by the shortage of water, not of nutrients.

Finally, fertilizer treatments may be ineffective or outright harmful because of a direct injury of tree roots by soluble salts, increased competition of weeds, or damages by late and early frosts.

Conclusion

It must be conceded that the improvement of soils supporting either nursery stock or forest stands involves many technical difficulties and cannot be accomplished without a knowledge of the principles of soil science and plant nutrition. Therefore, the effective use of fertilizers in forestry can be reached via the classroom, laboratory, and greenhouse, rather than through empirical trials. In fact, on the basis of the theory of probability, there are enormous odds that an indiscriminate application of fertilizers will produce harmful rather than beneficial results. On the other hand, definite success achieved with tree fertilization in different parts of the world indicates that the time is at hand when fertilizers will become an important auxiliary tool in the production of forest crops.

The successful results also suggest that the time has come to discontinue the publication of reports on unsuccessful fertilizer trials, especially those in which the reasons for the failure of fertilizer treatments have not been detected. The time spent on the preparation of a sterile paper of this kind would be more profitably invested in a careful investigation of the causes of the unresponsiveness of the treated forest stand. In a good many instances, a study of the failures of fertilizer treatments can bring more valuable information that the accidental successes! This information is critically needed now to produce nursery stock of a high growth potential, to ameliorate the stagnating plantation and woodlots, and in turn, to increase the world's output of forest products.

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Coming Events

Columbia River Section

The Columbia River Section will hold its annual meeting May 5-6, 1961, at the Marion Hotel, Salem, Ore.

Gulf States Section

The Gulf States Section will hold its annual meeting at the Edgewater Gulf Hotel, Edgewater, Miss., May 8-9, 1961.

Northern Rocky Mountain Section

The Northern Rocky Mountain Section will meet May 19-20 at Bozeman, Mont., on the campus of Montant State College.

The Libby and Flathead Chapters will hold a joint field meeting June 10 on industrial forest holdings near Thompson Lakes, Mont.

Ozark Section

The Ozark Section will hold its summer field meeting June 1 and 2, 1961, at Camden, Ark. Meeting headquarters will be the Camden Hotel.

An Evaluation of State Tree Identification Guides of the United States

John W. Andresen

THE much heralded population explosion with all its inflationary ramifications is also creating problems for the writers and publishers of tree identification guides. Increasing public demand for accurate and interesting dendrology guides coupled with spiraling publication costs are adding to the woes of already overburdened civil and educational agencies concerned with forestry activities.[1] To answer this unprecedented request several states are now relying on one-page mimeographed lists and many are forced to distribute "popular" tree guides that are both inadequate and obsolete. This shortage of competent dendrological publications is also evidenced by a lack, for most states, of modern, technical tree manuals for the more serious student.

It is the purpose of this paper, therefore, to summarize the historical development of state tree guides from 1842 to the present, classify the various types of tree guides, describe current cost trends of publication, and present suggested recommendations for future guides. The scope of the present study includes only tree identification guides that are truly confined to one or in a few instances several states. Since there are over 400 of these state guides issued as originals, revisions, or reprints, space limitations preclude a complete listing. In this review, reference is usually made to the original edition even though more complete editions or reprints may have been issued. The vast number of local and regional tree guides, and publications devoted entirely to shrubs and vines is listed elsewhere (*11, 12, 27, 42*).

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Historical Development

The first extensive tree guide compiled for an individual state seems to be that by Emerson (*32*). Although he originally received the report commission from Governor Everett of Massachusetts in 1837, it was not published until 1846. The first edition entitled "A report on the trees and shrubs growing naturally in the forests of Massachusetts. Published agreeably to an order of the Legislature, by the Commissioners on the zoological and botanical survey of the state," and the later editions are especially unique in several ways. In addition to the detailed dendrological descriptions, they also contain historical and silvical narrations, and include then existing and recommended silvicultural practices. The colonial and contemporary uses of the described species are written in a lucid style that has seldom been equalled. All of these features plus a series of superlative plates gathered from many sources provide a very interesting documentary of early American forestry practices. A discussion of the trees of Vermont by William Oakes (*112*: 173, 208-220) in 1842 does not compare with the imaginative presentation of Emerson but is an example of an early state tree list. It may be recalled that a few years earlier Loudon (*69*) and Michaux (*84*) the younger completed their classical works which were used freely by both Emerson and Oakes. Another publication of the mid-nineteenth century that is a delight to read is the interesting "The Woody Plants of North Carolina" by W. E. Curtis (*26*).

Twenty-three years elapsed before another new state tree-list appeared. The short-lived "American Journal of Forestry," whose only volume appeared in 1883, included tree lists of two southern states. Harvey (*44*) presented a systematic list of the native trees of Arkansas and wrote of the uses, general range, and sites of the individual species. In a similar coverage for Texas, Munson (*90*) described the trees and in addition listed pertinent local and regional tree books. Both articles were probably prompted by Sargent's "Forest Trees" (*102*) and the preparatory work for his *nulli secundus* "The Silva of North America" (*103*).

During the 1890's several state organizations released a series of tree identification guides whose scope varied from simple lists to a textbook (*21, 23, 34, 36, 91*). One of the earliest publications to include tree distribution maps was "Timber trees and Forests of North Carolina" (*95*) by Pinchot and Ashe. These publications set the styles for the deluge of both popular and technical tree guides that were to follow in the next sixty years, but perhaps the most widely used reference works still in use today is Sargent's "Manual of the Trees of North America" (*104*).

With the impetus provided by Pinchot, Roosevelt, Graves, Roth, and others to conserve and regulate the abused forest wealth of the nation, the tempo of tree guide composition quickened. The renowned botanist of California, Willis L. Jepson, contributed his "The Trees of California" (*62*) which was preceded by Eastwood's (*31*) "A Handbook of the Trees of

California." During this same decade the Maine Forestry Department released a 4½ by 9 inch pocket guide (*113*) which by 1951 went through seven editions. A very similar publication (*24*) was first distributed in 1907 by the Massachusetts State Forester's Office and proved so popular that it was reissued seven times, the last in 1935. Even though the illustrations used were not originals, but were borrowed from Vermont (*23*), these two tree guides served as the prototypes for the Mattoon-Illick tree booklets of the twenties.

The period of 1910 to 1919 witnessed the publication of a group of state tree-books that marked that decade as one of superior authorship. The first edition of Deam's (*28*) superlative "Trees of Indiana," Illick's (*51*) "Trees of Pennsylvania," Jepson's (*63*) "The Silva of California," which is a state equivalent of Sargent's "Silva," Otis' (*92*) "Trees of Michigan," and Small's (*108*) "Florida Trees" are among those that have yet to be equalled.

In the 1920's the late Wilbur R. Mattoon of the United States Forest Service in cooperation with 15 different state forestry organizations wrote or advised the writing of a popular tree guide of 4½ by 9 inches in size for the states of Arkansas (*18*), Connecticut (*77*), The District of Columbia (*74*), Florida (*73*), Georgia (*76*), Illinois (*78*), Kentucky (*72*), Mississippi (*75*), North Carolina (*47*), Oklahoma (*79*), South Carolina (*80*), Tennessee (*70*), Texas (*81*), Virginia (*64*), and Wisconsin (*117*). The number of reprints and editions of these pocket guides is over 75. Although most of the above states have replaced "Mattoon" with other bulletins, Virginia (*3*) is releasing its 13th edition and Florida (*5*) is currently distributing its 6th. The U. S. Forest Service still possesses most of the engravings (several are on loan at present) used to illustrate the Mattoon series.

Joseph S. Illick was also the author of a multitude of similar tree guides but his contribution was subsidized by the Charles Lathrop Pack Foundation and released gratis through the American Tree Association to many elementary schools. None of the states that released a Mattoon guide distributed the "Illick" guide, so apparently there was an effort to accommodate some of the states not benefited by Mattoon's works. The states that received Illick's guides were Indiana (*54*), Michigan (*55*), New Jersey (*53*), New York (*57*), Ohio (*58*), and the Commonwealths of Massachusetts (*59*), and Pennsylvania (*52*). The latter was the pilot edition for the series and printed privately by Illick. In contrast to the "Mattoon" guides only Michigan (*61*) and New Jersey (*56, 60*) published reprints. A few other publications that should be identified with the twenties are the prodigious 357-page description of the trees, shrubs, and vines of Alabama by Harper (*43*), Taylor's (*111*) first of the only two popular tree guides of Alaska, "Trees in Kansas" by Dickens, Whitmore, Scott, and Gates (*30*), and Perry's (*94*) "How to know the common trees and shrubs of Pennsylvania."

Several new state tree guides were published in the 1930's, but the depression years curtailed the release of many elaborate publications. Notable among the releases for this decade were Anderson's (*1*) "Trees and tree planting" which was helpful to the C. C. C. in Minnesota, Metcalf's (*82*) "Illustrations of California trees" designed for 4-H Club Leaders, Hansen's (*40, 41*) "The shade, windbreak, and the timber trees of South Dakota," and "Evergreens in South Dakota," Page and Bryan's (*93*) "Forest trees of Alabama," and Taber's (*110*) "Delaware trees."

The war and post war years from 1940 to 1949 saw several new publications, but most were reprints or supplementary editions of previously published works. There were, however, several guides that were distinct contributions and that broke away from the traditional format of tree guides. These were Billings' (*9*) "Trees of Nevada," Brown's (*13*) "Louisiana trees and shrubs," Hyland's (*48*) "The conifers of Maine," Hyland and Steinmetz' (*49*) "The woody plants of Maine," Smith's (*109*) "Michigan trees worth knowing," and West and Arnold's (*116*) "The native trees of Florida."

In the 1950's an increased interest by the public in the outdoors fostered by more leisure time prompted the release of 24 new tree guides which in many instances were so popular that several reprintings were issued within a few years of the original publication date. Little's (*67*) excellent work "Southwestern trees" for Arizona and New Mexico, Brown's (*14*) "Commercial trees of Louisiana," Lentz' (*66*) "Common forest trees of New Jersey," Mosher and Lunnum's (*88*) "Trees of Washington," Pool's (*96*) "Handbook of Nebraska trees," Vannorsdall's (*114*) "Trees of Ohio," and York's (*119*) "100 forest trees of Alabama" are citations of the higher caliber of tree guides now being offered to the public.

Although a rather austere situation was presented in the introductory remarks, there are about 25 popular and ten technical tree guides in print that are quite reliable. However, the future may offer even more vexations to authors and publishers if the demand for state dendrological literature continues to accelerate. To meet this challenge, foresters and botanists in Alaska, Idaho, Indiana, Kansas, Maryland, Michigan, Missouri, Montana, New Mexico, New York, North Dakota, Ohio, Puerto Rico, Utah, Virginia, and West Virginia (all personal communications) are now planning or have in press tree and/or shrub identification guides.

Styles and Format of State Tree Guides

Although the number of original and supplementary editions of state tree guides including their reprints is over 400, their varied array of styles can be grouped into five major classes. Each class can be further subdivided into units based upon the organization of publication. These are listed below with one or two examples of each:

A. Simple lists of trees usually

including keys but without detailed descriptions of individual species.

1. Journal article: "A check list of native and naturalized trees in Florida" (*6*) and "List of Colorado trees" (*8*).
2. State forestry organization release: "A list of native trees of Pennsylvania" (*7*) and "Check list of the native trees of Alabama" (*107*).
3. State experiment station and cooperative agency publication: "Check list of trees in Virginia" (*71*) and "Virginia trees, a check list of the more common species" (*46*).
4. Forestry school publication: "Short keys to the native trees of Oregon and Washington" (*118*).
5. Federal agency release: "A check list of the trees native to Oregon and Washington" (*89*).

B. Popular tree guides of about 100 pages or less that give brief descriptions of species.

1. Journal article: "The arboreal flora of Arkansas" (*44*).
2. State forestry organization release: "Forest trees of Illinois" (*35*) and "Common trees of Pennsylvania" (*50*).
3. State experiment station publication: "Trees of Iowa" (*22*) and "Trees of Idaho" (*19*).
4. Forestry school publication: "Common trees and shrubs of North Dakota" (*85*) and "Native trees of Georgia" (*10*).
5. Federal agency release: "Trees native to forests of Colorado and Wyoming" (*4*) and "Let's know some trees" (California) (*105*).
6. Philanthropic distribution: "Common trees of Ohio" (*58*) and "Trees of the District of Columbia, including some foreign trees" (*74*).
7. Private publication: "Common trees of Pennsylvania" (*52*) and "Trees and tree planting" (Minnesota) (*1*).

C. Semi-popular tree guides of over two hundred pages that usually include detailed species descriptions plus additional botanical information.

1. State forestry organization release: "Delaware trees" (*110*) and "Pennsylvania trees" (*51*).
2. State experiment station publication: "The trees of Vermont" (*20*).
3. Forestry school publication: "Trees of New York State native and naturalized" (*16*).
4. University publication: "Michigan trees" (*92*).
5. Private publication: "The trees of Pennsylvania" (*38*).

D. Natural history and famous or historical tree guides that are usually written in narrative style.

1. State board of agriculture report: "The native trees of Rhode Island" (*101*).
2. State experiment station publication: "Interesting trees of California" (*83*) and "Forest trees of New Jersey" (*39*).
3. Private publication: "Some American trees. An intimate study of native Ohio trees" (*115*) and "The historic trees of Massachusetts" (*106*).

E. Technical dendrology or silval manuals written mainly for the professional forester or botanist.

1. State forestry organization release: "Trees of Indiana" (*28*).
2. University publication: "The silva of California" (*63*).
3. Patronage group publication: "The indigenous trees of the Hawaiian Islands" (*97*).
4. Private publication: "Florida trees" (*108*).

In several instances publications that originated as state guides were expanded to include regional coverage. A 28-page list of trees and shrubs of Minnesota by Clements, Rosendahl, and Butters (*25*) was expanded to a 383-page book (*99*) including the same species and area, and finally enlarged to a 411-page manual (*98*) that covered the Midwest. A similar pattern occurred in New York. Brown's (*16*) excellent discourse on the trees of that state was also expanded and revised to include the northeastern United States (*17*). In the near future Sharpe and Spurr (personal correspondence) intend to rewrite Otis' "Michigan trees" (providing funds are forthcoming) to include the Lake States and adjacent territory.

The approach to coverage, scope, and format of the many state tree guides is almost as varied as the number of publications. The most disturbing element of this profuse variety is the lack of uniformity in the presentation of basic bibliographical information. Some of the major negative idiosyncrasies exhibited by authors and their publishers are lack of publication dates, absence of pagination, poor photographic or line drawing reproductions, vague or lacking information on edition or reprint number of a reissued publication (in several states no distinction is made between an edition and a reprint), and perhaps saddest of all, ancient and inaccurate range maps or range descriptions. Some are so poor that tree ranges do not even meet when the range map in one state is laid along side a map for the same species in an adjoining state. Many of these faults are still found in currently released publications, but the frequency of such errors is rapidly diminishing. The classification or arrangement of genera and species varies from a sound phylogenetic style to those that are alphabetical in either common or technical name. The type of classification is not critical but it would be of aid to the reader if an explanation of the classification scheme were given.

In recent years the traditional illustration pattern of line or half tone reproductions has been improved upon by some very clever cartoons. Hugh Hayes' illustrations in "Trees to know in Oregon" (*100*) and Shoup and Speck's sketches in "Trees of Washington" (*88*) are examples of a new approach that should add

eye appeal to formerly stereotyped tree guides. But it is doubtful if Charles E. Faxon's peerless drawings in Sargent's "Silva," the superior illustrations in Jepson's (*63*) "The silva of California," or the superlative photographs in Deam's (*28*) "Trees of Indiana" will ever be surpassed. These illustrations have been duplicated in countless other tree guides and recently Alabama obtained permission from Houghton, Mifflin and Co. to reproduce 100 of Faxon's plates in its recent tree guide (*119*).

Both the obverse and reverse sides of the front and rear covers of most "popular" paper backed tree guides have been used to carry forestry messages. Smokey, the bear, and his admonitions appear on many, opportunities at a particular forestry school appear on others, and pleas for conservation and tree planting are found on additional issues. Instead of the conventional pastel color used on most "poster covers," Arkansas (*87*), Louisiana (*14, 15*), Ohio (*29*) used very attractive simulated wood patterns to "dress up" the covers.

As a last note in relation to format, the various sizes of the tree guides should be mentioned. Among the smallest is "Common forest trees of West Virginia" (*37*) which is only 4 by 6 inches. At the other end of the scale is Jepson's (*63*) "Silva" which measures 9¾ by 13 inches. The many issues of the "Mattoon-Illick" series were between 4½ and 5 by 9 inches and although the most popular size today seems to be 6 by 9 inches, a more convenient size that would fit most pockets would be 4 by 8 inches e.g. Moore (*87*).

Publication Costs

Undoubtedly the most perplexing problem confronting the publishing agencies of state tree identification guides is the spiraling rise of printing and other costs. In turn authors are affected because they have to alter or delete parts of their manuscripts to conform to the budgetary limitations prescribed by their administrators.

Because publishing costs are directly related to such variables as number of pages and copies printed, size and quality of paper, printing process and mode of illustration reproduction, publishing contracts, etc., it would be difficult to compare accurately one state's publication costs against another's. However, to arrive at some indication of expenses a compilation of cost figures of 46 recently published tree guides revealed an average cost of $0.20 per copy with a low of $0.06 for a reprint copy of "Forest trees of Missouri" (*2*) and a high of $1.10 for the book "Delaware trees" (*110*).

Suggestions For Improvement of Tree Identification Publications

After a review of existing state tree guides, remarks by students and interested nature enthusiasts, and the information provided by foresters and librarians, the following recommendations are offered to those who anticipate the composition of a tree identification guide. In addition many helpful suggestions are offered by Blake and Atwood (*12*: 8-9). Before presenting the following thoughts it must be emphasized that the author bears the burden of responsibility for the content and quality of his tree guide. And further, his intended reading public should temper his presentation.

SUGGESTIONS FOR POPULAR STATE TREE IDENTIFICATION GUIDES

SCOPE: Species to be included should be abundant enough to be encountered over sizable areas of the state. Common introduced species should also be described. Rare native species, unusual varieties, and horticultural forms should only be listed if space permits.

OBJECTIVE: To present in a simple and lucid style, descriptions of the tree flora that will provide the reader with essential information and also arouse his interest to learn the identity of the trees and other plants of his state.

FORMAT: Existing editorial policies of the writer's organization should guide his decisions, but a stereotyping of previous publications should be avoided—be imaginative and original. Budgetary limitations should, of course, be considered in the initial planning of the coverage and layout. The over-all size and number of pages will depend on many factors, but a very convenient size is 6 by 9 inches with a content of 64 to 80 pages or other multiples of eight.

TYPOGRAPHY: A. Cover: Many contemporary tree-guide covers are illustrated with attractive photographic reproductions of forest trees or stands, or graphic line drawings of a forestry activity. Both of these and other poster type cover subjects are quite adequate as long as the quality of the illustration is crisp and clean, and the message imparted by the subject is simple and appealing. To reduce costs both the obverse and reverse of the front and rear cover should be utilized. With this same thought of economy, all pages in the publication should be used—leave no blanks.

B. Preliminaries: Most of the introductory materials can be included on one or two pages. Items as the title, author, publishing agency, date of publication, etc. can all be included on one page rather than expanding to three or four as in many bulletins. It should be stressed that the title on the cover and in the preliminaries should agree, and the date and a record of the edition and reprintings should always be included. A simple, clear, state-county map with lightly overlain forest types is of orientation value to the reader. Sources of the illustrative materials and the system of classification should be mentioned. A table of contents, although not essential, would also be of use to the reader.

C. Text: Descriptions of the species should be as original as possible (even though countless depictions have been written, there is still room for improvement). Herbarium or living materials should be observed and recorded, for the form of sugar maple in Wisconsin may be quite different from that in Tennessee. Previous written descriptions may serve as guides but the native materials should always be used in the dendrological description. Be

they line drawings or half tones, the best possible illustrations of leaves, fruit, bark, and tree-form with appropriate scales should be included. Distribution maps or written descriptions of range (the former is preferable) should be as accurate as possible. The information for the distributions can be obtained from herbarium records, observations of trained technical personnel, or from the author's records. Also of interest would be the nationwide distribution and site situations. Notes of natural history and uses of the species would spice the guide. In addition a list of state big-trees and their locations would appeal to the nature "buff."

D. Reference materials: Herein should be an annotated bibliography of tree guides for the state and region, a glossary of unfamiliar terms used in the text, and a species index including common and technical names.

SUGGESTIONS FOR TECHNICAL STATE TREE IDENTIFICATION GUIDES

SCOPE: Depending on the luxuriance of the state's flora, it may be desirable to limit the coverage just to trees, trees and shrubs, or to a complete coverage of all woody plants both native and introduced. Varieties, forms, and hybrids should be included in the discussion.

OBJECTIVE: To provide the most accurate and complete taxonomic descriptions and distribution patterns of the woody species of the state. This information must be of the highest quality for it will not only be used by state residents but will be looked to as an authoritative flora by international scientists.

FORMAT: The style and coverage should be left to the discretion of the author. A work of extraordinary length will probably require a grant-in-aid from a scientific foundation, for budgetary limitations in most states preclude the entire financing by a state treasury. The style may vary from such elaborate examples as Jepson's (*63*) "Silva" or Deam's (*28*) "Trees of Indiana" or be as simple as "The woody plants of New Hampshire" (*45*) or "The woody plants of Maine" (*49*), for all of these accomplish their objectives. In most instances the extent of the publication will depend on the stature and available time of the author. These technical dendrology manuals will receive more library use than the popular guides so it is advisable to use a heavier stock of paper for the pages and a durable cover. A complete work will probably include several hundred pages.

TYPOGRAPHY: A. Cover: A buckram, leatherette, or other type of wear-resistant material should be used to sheathe the work. No illustrations or other adornment are necessary on the outside, but the title, author, and publisher are needed. The inner covers and their contiguous pages could be utilized to depict vegetation and physiographic maps.

B. Preliminaries: The formal style of displaying title page, dedication, copyright, frontispiece, etc., is suggested. Included in a rather extensive introduction should be a review of literature pertinent to the tree manual and other vegetation either local, state, or regional. A detailed set of physiographic, vegetation, soil, and geologic maps (if not depicted elsewhere) should also be included. It would be well to outline some of the urgent dendrological problems that are worthy of investigation.

C. Text: Complete and detailed descriptions of all state materials should be presented, which would include comparisons to other geographic areas. As in the popular tree guide suggestions, observations of pressed and living materials should be made to prepare the species descriptions. A much larger sample that would encompass more variation than required for the popular guide is essential. Illustrations need not be included, for accurate word pictures usually will be more than adequate. The interested person can find illustrative materials in other sources. It must be remembered that an illustration shows only one point on a scale of normally distributed variation. I believe the type and number of illustrations (if considered essential) will depend upon the uniqueness of the specimens and the funds available. A complete listing of the soil series and other edaphic and climatic features related to the species distribution should be included. Detailed distribution maps on a county basis are a must and a list of the herbarium and other records that document the distribution would be of immeasurable value. The difficult problems involved in accurate range mapping procedures are related by Little (*68*:201) who stated, "The greatest need now is for more articles or bulletins devoted to distribution maps of native tree species in a single state and prepared by an experienced resident botanist or forester." In a rather hypercritical commentary on tree books in general the late M. L. Fernald (*33*) presented numerous examples of errors in tree distribution as found in several publications. He made few constructive comments, but instead threatened the errant authors with further censure. Little (*68*:195, 201) on the other hand remarks, "It is far easier to detect a minor flaw along a boundary line than to prepare a better map," and, "Instead of condemning further the inaccurate tree distribution maps already published, those interested should help make better ones."

D. Reference materials: A complete literature citation section is essential if the state tree book is to be of value to others. Appendices listing state arboreta, herbaria, and areas of special botanical interest are of value. The index should be cross-referenced and complete.

Again, these thoughts are offered as suggestions and may or may not be applicable in the composition of a state tree identification guide.

Summary

A review of over 400 editions and reprintings of state tree identification guides of the United States of America indicated that a tremendous variety in quality and coverage exists. A style classification of popular and technical tree guides is presented. Examples of publication costs and variables are given. Suggested recommen-

dations for composing both popular and technical tree identification guides are offered.

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Wanted: A Picture of Nathaniel H. Egleston

In connection with a forthcoming article of an historical nature, the Journal of Forestry has need of a photograph of Nathaniel H. Egleston who served as forestry agent in the U. S. Department of Agriculture, 1883-1885.

It will be appreciated if any reader having such a picture, or knowing of the existence of such a picture, will notify Henry Clepper, executive secretary.

Effects of Prescribed Fires on Understory Stems in Pine-Hardwood Stands of Texas

Edwin R. Ferguson

In some forest types in the South and East where hardwoods of poor quality have become effective competitors of juvenile pines, prescribed burning has afforded temporary control of these undesirables. In the loblolly-shortleaf types of the upper Coastal Plain, however, experience with prescribed burning has been limited.

In 1952, a study was begun on the effects of prescribed fires on small stems in the east Texas uplands. The results of burning in four seasons were tested by repeating the study in three years. Only results that are repeated year after year under varying weather conditions can be relied on in planning prescribed burns. A single year's tests may provide valuable clues but may also be misleading.

In mixed stands fire can be useful for hardwood control because it is somewhat selective—the smaller the stem, the more likely it is to be killed. Thus, it is fortunate that on many southern problem areas the hardwoods and pines differ in size. Hardwoods generally make up the understory and are predominately small, while overstory pines are larger (*4, 5*). Reasonably hot fires will kill back sizable proportions of the hardwood stems without seriously damaging the pine overstory (*1, 2, 6*).

The study area supported an immature loblolly-shortleaf sawlog stand and scattered overmature pines of the same species (*Pinus taeda L.* and *P. echinata* Mill.). Pine reproduction was sparse, but there was a fairly heavy understory of sapling and pole-size hardwoods. Topography was slightly rolling with maximum slopes of 10 to 12 percent. The soils were predominately very fine sandy loams of the Sawyer and Boswell series.

The site had not been burned for at least 10 years. Litter was 0.2 to 2.0 inches deep, being thickest where pine needles were present. Grass and weeds were almost completely absent, as was other low vegetation. In general, the fuel was light, but probably typical of this forest type in east Texas.

During each of three years, three blocks of four units were selected for similarity in stand, and one unit of each block was chosen at random for burning at each of four seasons. All 36 units were square, those burned the first year being one-half acre in size, those burned in later years one acre.

Since each of the yearly installations was at a separate location, year is confounded with location. Geographically, the areas were not far apart; the 1952-1953 area was about a quarter of a mile from the 1954-1955 area, which was adjacent to the 1955-1956 area. Because there were only minor differences in soil, topography, or plant cover among the installations, differences in fire effects are believed due largely to variations in conditions from year to year.

Three species or species groups were observed:

Sweetgum (*Liquidambar styraciflua* L.)

Post and red oak (*Quercus stellata* var. *stellata* Wangenh. and *Q. falcata* var. *falcata* Michx.)

Loblolly and shortleaf pine

Four stem diameter classes were sampled, i.e., 0.6-1.5, 1.6-2.5, 2.6-3.5, and 3.6-4.5 inches.

Quarter-acre and half-acre circular plots were located around the center of the half-acre and acre units. Plots were divided into 10 equal segments and a random starting point was selected in each segment. One stem of each species-size class was located in each segment, as close to the starting point as possible. If a segment was deficient in any species-diameter class, the missing stem(s) was located, if possible, in the nearest segment with a surplus.

Weather conditions made it impractical to adhere strictly to the original plan of burning during specified phenological periods. Table 1 indicates the desired period and the actual dates on which fuel and weather were suitable. Weather prior to and following burning was quite variable, as were burning conditions (Table 2).

All of the prescribed burns were headfires. The general procedure was to set fire along the windward boundaries of the plots. The flanks were fired just in advance of the moving head to reduce the possibility of a breakover. The leeward boundaries were backfired to secure the headfires. These fires were similar to the strip headfires that might be used in large burns.

The installations and observa-

Table 1.—Phenological Period, Season, and Dates of Burning

Phenological period	Season	First year	Second year	Third year
Early dormant	Winter	12/17/52	12/6/54	12/15/55
Late dormant	Late winter	3/6/53	2/15/55	3/8/56
Stem elongation	Spring	5/8/52	4/27/55	5/21/56
Vegetative maturity	Late summer	8/29/52	8/20/54	9/12/55

The author is a member of the Southern Forest Expt. Sta., Forest Service, U. S. Dept. Agric. He is assigned to the Nacogdoches Research Center, maintained in cooperation with Stephen F. Austin State College, Nacogdoches, Texas.

TABLE 2.—AVERAGE CONDITIONS DURING BURNING

Date of burn	Days since last rain over 0.1 inch	Relative humidity	Air temperature	Fuel moisture[1]	Wind Velocity per hour	Wind Direction	Average flame height	Plot burning time[2]
	No.	*Percent*	*°F*	*Percent*	*Miles*		*Inches*	*Minutes*
5/8/52	9	33	86	5.5	2-3	SE	30-36	35
8/29/52	9	26	91	1.0	3-4	S	24-36	41
12/17/52	13	64	66	5.5	3-4	SE-S	18-24	33
3/6/53	4	41	71	5.0	2	SE-SW	12-24	16
8/20/54	20	55	92	2.5	1-2	S-SE	36-48	33
12/6/54	22	36	58	5.8	1-2	S-SW	12-20	50
2/15/55	10	47	71	6.2	3-5	S-SE	18-24	28
4/27/55	15	39	86	4.2	2-3	SE	12-24	37
9/12/55	9	32	94	3.0	1-2	N-NE	6-18	79
12/15/55	9	28	50	3.0	2-3	SE	24-36	31
3/8/56	10	21	62	2.0	2	NE	24-56	22
5/21/56	5	48	89	4.0	4-5	W-SW	12-24	68

[1]Estimated from fuel-moisture sticks in a woods station.
[2]First 4 plots were ½ acre in area, all others 1 acre.

tions covered six years. Seasonal precipitation and deviations from a long-term normal, as recorded by the U. S. Weather Bureau Station at Nacogdoches, are shown in Table 3.

Close to the end of the second complete growing season following each fire, all the sample stems were relocated and records made as to condition of the stem, number and type of sprouts (basal or stem), and height and diameter (at 6 inches above ground) of dominant sprout.

The term killed-back is used here to refer to young trees that showed no life in the original above-ground parts, although in many cases sprouting indicated that the roots were still alive.

For each species group, the arc sines of the square roots of the three-year percentage data on kill-back and complete kill were subjected to analyses of variance. When the null hypothesis was disproved, individual comparisons were made following the analytical methods of Duncan (*3*). Data on sprouting were analyzed separately for each year, but the general lack of significance made combined analyses for the three years unnecessary.

Results

Year and species.—Year to year effectiveness of the burns, as measured by injury to sample stems, was statistically different only for kill-back percentages, and not for complete kill.

Sweetgum had the highest percent of stems killed-back (62), oaks were intermediate (38), and pines lowest (28) (Fig. 1). Although incidence of damage was lower for pine than for the hardwoods, mortality was greater since fire-injured loblolly pines do not usually sprout, and the number of shortleaf sproutings was negligible.

There were no significant differences between the first two years in the kill-back percentages, but all species had significantly smaller percentages of stems killed-back in the third year than in either of the preceding years—chiefly because of low injury rates from the spring and summer burns of 1955-1956.

Season.—Winter burns killed-back very significantly fewer hardwood stems—42 percent for sweetgum and 20 percent for oaks—than fires at any other season (Fig. 2). While summer burns killed-back more hardwoods than either spring or late winter burns, the difference was not significant.

Pine stems were not affected in the same manner; a highly significantly larger proportion, 53 percent, were killed-back in the summer, and there were no significant differences between the kill-back percents for the other three seasons.

In terms of complete kill, sweetgum stems exhibited no significant relationships with season of burn; the range was from 12 percent for winter burns to 23 percent for summer burns.

In the oaks, by contrast, spring and summer burns averaged more than 10 percent complete kill, while winter and late winter burns averaged less than 2 percent complete kill, a difference which proved highly significant.

Over all seasons and all years the percent of sweetgum stems completely killed was considerably higher (18) than the percent of oaks (5), and both were lower than the percent of pines (28) killed-back. It is apparent that the pines suffer greater permanent damage than either of the hardwoods.

Size class.—Three-year average kill-back differences between all stem-size classes were significant for all species, with each smaller size class suffering higher kill-back

TABLE 3.—INCHES OF SEASONAL PRECIPITATION AND DEVIATION FROM NORMAL

Year	Winter (Dec.-Feb.) Total	Winter (Dec.-Feb.) Dev.	Spring (Mar.-May) Total	Spring (Mar.-May) Dev.	Summer (June-Aug.) Total	Summer (June-Aug.) Dev.	Fall (Sept.-Nov.) Total	Fall (Sept.-Nov.) Dev.
1952			14.17	0.12	6.04	−3.99	6.99	−3.23
1952-53	13.25	.53	28.10	14.05	14.77	4.74	8.20	−2.02
1953-54	10.43	−2.29	9.87	−4.18	2.56	−7.47	9.18	−1.04
1954-55	10.44	−2.28	11.03	−3.02	8.15	−1.88	5.18	−5.04
1955-56	10.21	−2.21	9.53	−4.52	9.12	− .91	4.99	−5.23
1956-57	12.40	− .32	26.24	12.19	8.98	−1.05	26.44	15.52

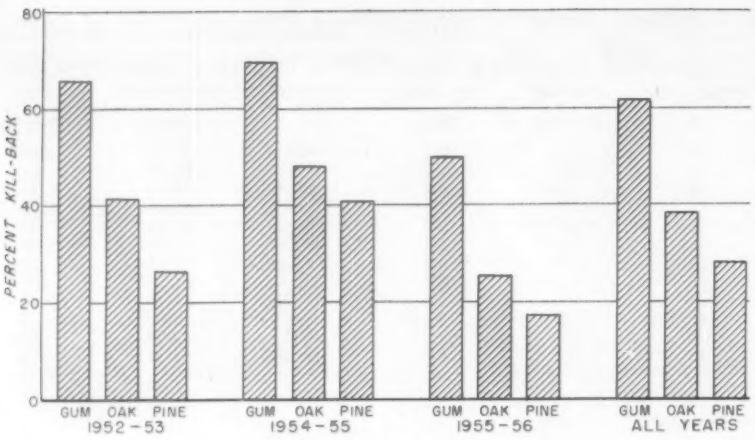

FIG. 1.—Average kill-back.

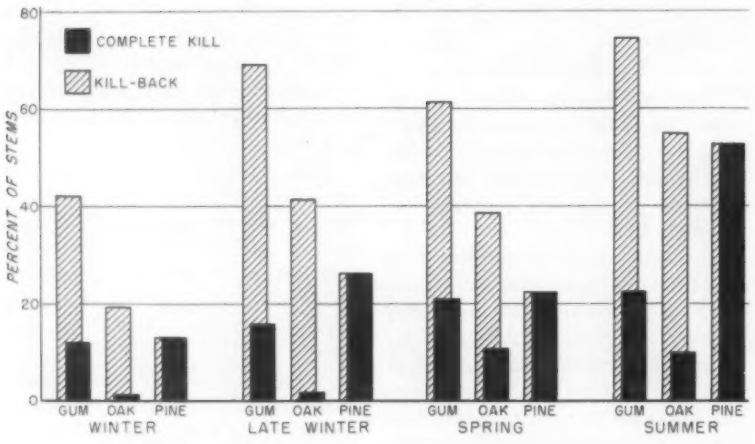

FIG. 2.—Kill-back and complete kill, by species and season.

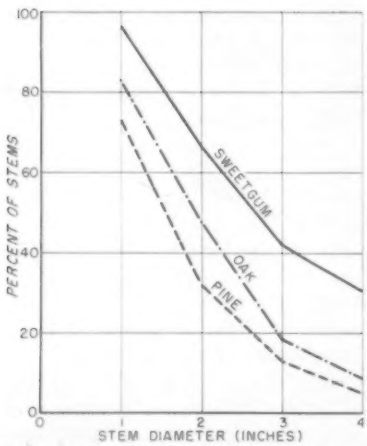

FIG. 3.—Kill-back by stem-size classes and species.

than each larger class (Fig. 3). The differences were highly significant except between 3- and 4-inch sweetgum, where significance was at the 5-percent level.

Complete-kill, to a certain extent, was also related to stem size—1-inch stems suffered most. The analysis, however, did not indicate any consistent significance between stem sizes in the hardwoods. In sweetgum the range of kill was from 24 percent for 1-inch stems to 15 percent for 3- and 4-inch stems, and in oaks from 8 to about 3 percent.

Sprouts.—Although at the end of the second growing season after the burns, the average number of sprouts per "dead" sprouting stem was about equal for the hardwoods (sweetgum 4.9 and oaks 5.3), the dominant sweetgum sprout was larger, averaging 0.33 inch in diameter and 39 inches tall, as compared to 0.26 and 26 inches, respectively, for the dominant oak sprout. None of the differences was statistically significant.

Winter and summer burns produced more, larger, and taller sprouts on both sweetgum and oak than did burns in the late winter and spring. In general, late winter burns gave best control of sprouting.

Original size of the killed-back stem had only a slight relationship with number, diameter, and height of sprouts.

Discussion

Any large prescribed burning operation, continuing through several years, might follow a pattern similar to that reported for this study, that is, with some burns highly effective and others affording only nominal control of small hardwoods.

In view of the variations in kill-back and complete kill by species, it is obvious that prescribed burning for hardwood control should be restricted to: (1) areas with no small pines, (2) areas where small pines are expendable, or (3) areas where the undesirable hardwoods are smaller than the pines.

Selection of an appropriate season for burning will, to some degree, depend on the composition of the understory. If the hardwoods are primarily oaks, the burns should be made well within the growing season. This same period seems to afford the best control of sweetgum stems, although late winter burns are almost equally effective. If it is desired to minimize damage to pines that are growing among hardwoods of smaller size, burning should not be scheduled during the latter part of the growing season.

The fact that kill-back was substantially greater for 1- and 2-inch stems than for 3- and 4-inch stems indicates that hardwoods must be fairly small if they are to be controlled by burning.

Sprout occurrence and rate of development importantly determine utility of fire for silvicultural purposes; in this study, even after two years, the larger sprouts were still of a size easily controlled by fire. Although the sprouts from injured oaks were fewer and smaller than from sweetgum, the possibilities for prescribed burning where oaks predominate are not so great as where sweetgum stems are in the majority.

The most practical use of prescribed burning will be to prevent undesirable hardwoods from gaining a foothold in pine stands or in conjunction with other cultural operations directed at control of the larger hardwoods.

Summary

Replicated prescribed burns were made at four seasons, in three years, in an east Texas forest containing an immature loblolly-shortleaf pine overstory and a fairly heavy hardwood understory. Effects were noted on small stems (less than 4.5 inches in diameter) of sweetgum, post and red oak, and pine.

Although the behavior of the individual fires varied, results were fairly consistent, indicating that general limits can be set on expectations from prescribed burning for hardwood control.

Proportionally more hardwood than pine stems were killed-back, but most of the damaged pine stems were killed, while about 90 percent of the injured hardwoods resprouted from their rootstocks.

Sweetgum stems proved more susceptible to fire injury than oak stems—almost twice as many sweetgums as oaks were killed-back and over three times as many were completely killed.

Growing-season fires reduced the hardwood understory more and killed more pine than fires during the dormant season.

One- and 2-inch stems of all species were more effectively controlled than larger stems.

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PLANT 200 MILLIONTH TREE—Otis D. Hallin, vice president timber, Crown Zellerbach Corporation, looks on as the Southern Timber Division's 200 millionth pine seedling is planted by Lon Miley, P. M. Garrison, and Oscar Jenkins. Plaque points out that for 40 years this hand-planted forest had grown under the stewardship of Great Southern Lumber Company, Bogalusa Paper Company, Gaylord Container Corporation, and Crown Zellerbach Corporation and is one of the outstanding industrial forests in the world.

Softwood Lumber Markets and Southern Forestry[1]

Joseph Zaremba

DURING a recent study of forestry and wood utilization practices in the southern United States the writer found almost unanimous agreement among foresters that a new concept of forest management is necessary. Time and again foresters have acknowledged that much of what they have been taught about forest management is too strongly woods-oriented and is no longer sufficient to cope with the problems which today characterize this region. The southern forest economy is now strongly market-oriented, and foresters have to learn how to think and plan in terms of market requirements.

The swing toward market orientation has been subtle, but nevertheless, real and lasting. How did it occur?

History

Forestry in the South today is much different from what it was a few decades ago. The old-growth timber is almost gone, and younger and much smaller trees now make up the resource base for the wood-using industries.

No other major forest region has made as much headway as the South in the transition from an old-growth to a young-growth economy. The West, where extensive areas of old growth still exist, will not fully complete the transition for many years. The North was cut out before the South, but a relatively unfavorable climate, complex silvicultural problems and comparative economic disadvantages have greatly delayed the intensification of management of northern forests.

The original forest in the South was at first thought to be inexhaustible and was cut heavily to furnish raw material for an expanding economy. Peak lumber output occurred in 1919, when about 12 billion board feet of southern lumber was harvested. Gradually the supply of virgin forest dwindled. Lumber output declined as more and more mills ceased production. Faith in an unlimited timber supply was now replaced by the fear of a timber famine.

But before the entire old-growth supply was gone, it could be seen that much of the cutover land supported new growth. Under favorable conditions, this new growth quickly attained sawtimber size. A rising proportion of southern lumber output was derived from this young growth, and today virtually all lumber is milled from such timber.

Sawlog quality, particularly with respect to size, knots, and wood density, declined as more and more of the harvest was taken from young growth. But scientific management of young growth was expected, in time, to arrest this downward trend and bring about some improvement in quality. Scientific management of softwood forests, at least in the lower South, is already paying off in improved sawlog quality.

During the transition to a young-growth economy there was a shift to smaller sawmills. Many large mills designed for old-growth timber were unsuited for the processing of smaller young growth. Initially, many of the incoming mills were portable units utilizing leftovers from old-growth forests and scattered stands of young growth. But medium-size mills of a more permanent and efficient design are now replacing portable units as more and more young growth is put under scientific management.

One of the most important differences between the old-growth and the young-growth economy is the fact that in the old-growth economy and the early transition period, the market easily adjusted to changes in the forest resource. If a certain species disappeared other species were used in its place. Or, to cite a more familiar case, when the quality of sawtimber declined, consumers were satisfied to absorb the lower quality.

Today, however, the role of the market in the South is reversed. It no longer occupies this passive or yielding position in the forest economy. Consumers are no longer willing to accept just any kind of wood that is placed on the market, because advancing technology is providing them with good substitute materials. Realizing this, foresters are aware that consumer requirements must play a more prominent role in forest management planning.

Recent Developments: The Softwood Lumber Market

The long-prevalent belief in an inexhaustible timber supply stemmed from the misleading notion that the old-growth forest was so extensive relative to lumber consumption that it would last for

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[1]To get much of the material for this article, the author made a field study of forestry and wood-using practices in 10 southern states during June 1959. Many of the opinions and facts stated here reflect the considered judgment of industry leaders in this region. The part dealing with wood utilization is based primarily on the author's doctoral dissertation, "Some problems in forecasting future wood requirements." Harvard University 1958.

many generations. But as supplies diminished and the fear of a timber famine replaced the earlier optimism, foresters took measures, such as tree planting and fire protection, which tended both to conserve and to increase the forest resource.

These efforts in the South are beginning to pay off. Intensively managed southern forests are very productive. Foresters now are wondering whether there will be a market for the increased supply. The fear of famine has been replaced by a concern for outlets.

Foresters, moreover, are getting more and more concerned about the kinds of wood they should grow. This is understandable, for any productive effort which seeks to satisfy a consumer must begin with knowledge about the consumer's needs. Foresters cannot, for example, make intelligent decisions on spacing, rotation, species, and a number of other questions without reasonable forecasts regarding types of wood that will sell in future markets. This concern for the market reflects professional maturity and should be viewed with enthusiasm and a sense of encouragement.

A major aspect of the market for which foresters are showing a growing concern is the decline in the use of wood siding for house exteriors and in wood used for house foundations. These trends have caused a change in the demand structure for southern softwood lumber.

House exteriors.—A trend toward nonwood exteriors began immediately after World War II. It gained speed after 1950 and in 1956 about 85 percent of the single-family houses built in 16 southern states had nonwood exteriors,[2] usually with wood trim manufactured from western species. In Florida, concrete block has replaced siding; in the remainder of the South, it was brick veneer and to some extent asbestos shingles, masonite, and other materials.

This development took place within a short period of time and may have occurred almost unnoticed. Nevertheless, the lumber market for house exteriors in the South is at least temporarily lost. Since the select grades of lumber are used in exteriors, the loss of this market can be expected to reduce the requirements for such lumber.

What is the reason for the displacement of lumber by other materials in house exteriors? Apparently high lumber prices are not entirely to blame. Lumber prices were not rising as rapidly as the prices of other materials when most of the substitution was taking place. The fact is, southern home buyers have switched their preferences from wood to nonwood materials. An analysis of the consumer's choice of construction materials for exterior walls has shown that preference (or attitude) is capable of relegating price to a minor role.[3]

Paint failure and decay on wood siding, which lead to house maintenance problems, are the factors underlying the loss in consumer satisfaction with clapboard. Homeowners, above all, dislike the appearance of paint failure and want to avoid the cost of frequent repainting. And every one of the 150 foresters, sawmill operators, and building inspectors visited in the southern field study believe that paint failure is the main cause for the shift to nonwood exteriors in the South.

House foundations.—A trend toward the concrete slab house foundation, which requires no wood, also began after World War II. In the far southern portions of the United States, concrete slab foundations have almost completely replaced crawl-space foundations in new construction.[4] Only the common grades of southern pine are used here, so the loss of this market would reduce the requirements for this lumber.

Slab foundations, however, have not proved to be completely satisfactory to homeowners. Problems occur when the slab cracks and when the need arises to repair plumbing. Besides, the slab did not solve the termite problem, as many had hoped, because termites can work up to the wood through expansion joints and cracks in the concrete. This consumer dissatisfaction has halted the trend to slab in the cooler areas of the South and has even started a trend back to the crawl-space foundation in many areas.

A strong consumer preference for hardwood floors, which are easily secured to floor joists in crawl-space houses, also helps to account for the trend back to this type of foundation. Where ground conditions do not rule it out, a well-constructed crawl-space foundation with wood treated to resist termites has a good chance of regaining the favor of consumers in many southern areas where it was displaced by the slab.

Analysis of Lumber Demand

Exteriors of southern homes have been one of the principal markets for the select grades of southern pine lumber. But the shift to nonwood exteriors in the South has decreased the requirements for such lumber. Since a relatively small amount of southern pine is used for this purpose elsewhere in the country, the shift to nonwood exteriors in the South itself is sufficient to reduce drastically the demand for some of the select grades of southern pine (particularly B and Better).

In contrast, the shift to concrete slab foundations, although attracting much attention, has probably not been of sufficient magnitude to create much of a change in demand for the common grades of lumber. Both in the South and in adjacent areas they are widely used for studding, rafters, joists, sheathing, and for general construction purposes. Thus we have reason to believe that the demand for the select relative to the common grades of southern pine lumber has declined.

Indeed, even trends in lumber prices suggest that such a shift in lumber demand has occurred. For a number of years, the price mar-

[2] U. S. Dept. of Labor, Bureau of Labor Statistics. Characteristics of new housing—1956. Part 1. Data on general characteristics.

[3] Zaremba, J. The consumer's attitude toward lumber in exterior walls of houses. Jour. Forestry 57:90-93. 1959.

[4] Zaremba, J. The consumer's attitude toward wood in house foundations. Jour. Forestry 57:358-362. 1959.

gin between B and Better and the common grades of southern pine lumber has been decreasing.[5] Since 1955, this decrease has been particularly rapid. An increase in the softwood sawtimber supply in the lower South may partly explain this change in the price structure. But considering what is happening in the lumber market, the convergence of these two price trends, as we have already suggested, is most likely due to a decrease in the demand for select-grade relative to common-grade lumber.

What Foresters are Doing

Recent shifts in lumber demand have been reflected all the way back to the woods. The difficulty of marketing the select grades of southern pine in many parts of the South has made foresters wonder about the future. Some foresters predict that the demand for the select grades will continue to shrink relative to the demand for the common grades of lumber and recommend shorter-rotation management, perhaps even "maximum fiber production." They argue that lumber demand in the future will be mostly for common-grade lumber which can be milled from short-rotation timber. They envisage a declining market for wood in natural form and an expanding market for wood in reconstituted form. They observe that with the rising consumption of such products as fiberboard and paper, the market has already moved strongly in this direction.

They feel, also, that in the future the West will supply an increasing proportion of the select grades of lumber for southern consumption. Western species have already gained a strong foothold in the South. That public confidence in southern lumber is badly shaken is vividly shown by signs on lumber yards in many parts of the South which proudly advertise western wood.

Many other foresters, however, are still optimistic about the future market for the select grades of southern pine and advocate a longer sawtimber rotation. They believe that the market for house exteriors will be won back, and they see, in addition, expanding markets from rising incomes and population, and from increasing consumption of finish-grade lumber in newer uses such as interior paneling. They contend, too, that with the eventual disappearance of the virgin timber in the West, the South may be counted on to supply an increasing proportion of the nation's requirements for select-grade lumber.

Furthermore, developments in the pulp and paper industry may themselves help to bring about a longer timber rotation in the South. Older trees tend to yield higher quality pulp, and there is a growing feeling among some industry foresters that more and more of the pulp requirements should come from such trees. If so, the difference between pulpwood and sawtimber rotations may not be great.

Sawmilling practices are also responding to changing markets. The difficulty of moving some of the select grades of lumber has caused many southern mill operators to slacken efforts to cut for grade. This development, naturally, will tend to speed up mechanization and increase productivity of the southern pine lumber industry. Already, there is a strong trend toward the installation of the gang mill.

Even though foresters disagree in their predictions, they all recognize the important role of market forecasts in forest management planning. This concern for the market means that foresters are also interested in ways that the market can be influenced.

Nonprice Competition

When assessing future markets, it should be stressed that the trend in consumption of a product can be influenced and, to some extent, directed by product improvement and advertising. Today, there is great emphasis placed on the effect of lumber prices upon lumber consumption. But what about the nonprice factors that influence lumber consumption? To emphasize price implies that the lumber industry must somehow hold its prices down in order to compete successfully with substitute materials. But in the American economy at large, price competition is declining in importance. Arthur Burns, for four years the No. 1 economic adviser to President Eisenhower, stated recently that the present-day inflationary threat in the American economy is caused, in part, by the tendency of business to eliminate price as a competitive factor, restricting competition to nonprice factors—mainly quality, service and preference.[6]

The industry-sponsored wood promotion program now under way represents the first real attempt to cope with declining lumber markets by means of methods employed by lumber's competitors. If this program is put on a continuing basis and accelerated, the lumber market will undoubtedly expand.

Here is a unique opportunity for cooperation between the industry and the forestry profession. To the extent that sales promotion can direct the trend in consumption of a particular kind of wood, the forester's task of prediction is made easier. At the same time, the forester's contribution in making available the type of product which is advertised must be defined more clearly.

Lumber and wood products have recaptured many lost markets already. The swing back to wooden windows, wooden kitchen cabinets, and crawl-space foundations are notable and familar examples. But for a trend back to wood house exteriors to occur, the public must have assurance that they will not be troubled with paint failure and wood decay. Here, in the struggle to improve wood's competitive position, is one of the greatest challenges to the lumber industry and the forestry profession.

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[5] Duerr, Wm., J. Fedkiw, and S. Guttenberg. Financial maturity: A guide to profitable timber growing. U.S.D.A. Technical Bulletin No. 1146. 1956.

[6] Burns, A. Prosperity without inflation. Fordham University Press, New York. 1957.

Effect of Seed Size on Germination, Growth, and Survival of Slash Pine

Eugene Shoulders

SEED SIZE influences germination of many coniferous seeds or the initial growth of the resulting seedlings (*1, 2, 3, 4, 5, 6, 7*). Often both are affected. In general, large seeds have been found to germinate faster and more completely than small seeds and to produce seedlings whose initial growth is greater. The growth advantage has usually disappeared after a few years; but some authors believe the initial advantage persists, so that seedlings from large seeds usually form the dominant trees in the stand.

This article reports a study in which slash pine (*Pinus elliottii* Engelm.) seedlings were grown from a single lot of seed that had been sorted into size classes. Briefly, sorting did not impart any important benefits. Small seeds produced smaller seedlings and fewer plantable seedlings than medium and large seeds, but the overall performance of the lot was the same whether seed was sown mixed in the nursery bed, or separated into size components and sown.

Study Methods

The lot consisted of approximately 500 pounds of slash pine seed collected in Georgia in 1955. Prior to sorting, the seed had been thoroughly cleaned. Cutting tests revealed it was 89 percent sound. It averaged about 16,000 seeds per pound. Sorting was done on a commercial seed cleaner; Table 1 shows sizes of circular screen apertures used to separate the seeds, the proportion of the lot in each size class, and the average number of seeds per pound in each class. An unsorted portion was reconstructed by thoroughly mixing proportional amounts (by weight) of small, medium, and large seed.

Laboratory tests were conducted with the sorted seed to determine the effects of seed size on germination.

Sorted and unsorted seed was sown in the nursery in a randomized block design on April 10, 1957. Plots were 4- by 484-foot nursery beds. Sowing rates were calculated to produce a uniform stocking of 40 seedlings per square foot at lifting time. None of the seed was stratified.

The beds were sampled on May 23 and 24, 1957, to determine germination of seed and actual seedling catches. During July, four permanent sample plots were randomly located in each bed. These were hand weeded and thinned to a density of 40 seedlings per square foot.

Final stocking of the beds was estimated by counting all seedlings on the permanent sample plots. The center 25 seedlings from each plot were used to determine size and grade of planting stock, and a sample of the remaining seedlings, with injured and diseased individuals discarded, was planted on two different sites in central Louisiana on January 24, 1958. Seed size treatments were replicated three times on each site. Individual plots contained 50 seedlings. After planting, the seedlings were classified as plantable or cull; morphological grades 1 and 2 (*8*) were considered plantable and grade 3 cull.

Survival and growth of plantable and bed-run seedlings were evaluated after one year in the field. Only seedlings free from disease or insect injury were included in these appraisals. It was necessary to identify and exclude diseased and insect-injured seedlings because of a high incidence of southern fusiform rust (*Cronartium fusiforme* Hedgcock and Hunt) in the nursery in 1957 and an attack on one of the test plantings by Texas leaf-cutting ants (*Atta texana* Buckley). Results from the two sites were quite similar and have been combined in this paper.

Results

Germination. — Small, medium, and large seed germinated equally well in the laboratory, gross germination in 44 days averaging 75 percent. Germination was rapid and seed of the various sizes germinated at similar rates. Fifty-nine percent of the small seed, 60 percent of the medium seed, and 61 percent of the large seed germinated in 8 days, and germina-

TABLE 1.—CLASS LIMITS, NUMBER OF SEEDS PER POUND, AND PROPORTION OF SEED LOT IN SMALL, MEDIUM, AND LARGE SIZE CLASSES

Class of seed	Size of aperture		Proportion of seed lot in each class		Seeds per pound
	Passed by	Retained by	By weight	By number	
	Inches		*Percent*		*Number*
Small	10/64	———	24.1	30.7	20,800
Medium	12/64	10/64	52.0	50.7	15,900
Large	———	12/64	23.9	18.6	12,700
Unsorted[1]	———	———	———	———	16,300

[1]This separate was reconstructed from proportioned amounts (by weight) of small, medium, and large seed.

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tion of all sizes equaled or exceeded 72 percent in 21 days.

Germination in the nursery was slightly lower than in the laboratory—70 percent of the unsorted seed germinated and the weighted average germination of small, medium, and large seed was also 70 percent. Nursery germination ranged from 64 percent for small seed to 73 percent for medium seed, but the differences were not statistically significant.

Stocking and survival in the nursery.—Initial stocking in the nursery bed, 44 days after sowing, ranged from 45.6 seedlings per square foot for small seed to 54.2 for medium-sized seed. Beds sown with large and with unsorted seed averaged 53.8 and 51.2 seedlings per square foot, respectively. Stocking from small seed was significantly lower than stocking from medium, large, or unsorted seed, but other differences were not significant. Part of the difference in stocking resulted from errors in sowing rates (the drill did not sow the exact weights of the various separates of seed calculated to produce the desired stand), and part was due to the lower germination of small seed, even though germination percents, themselves, were not significantly different.

Variations in density between size classes were corrected by thinning all sample plots to 40 seedlings per square foot in July. Subsequent mortality, principally from hand weeding, reduced stocking considerably below this level. By lifting time, stocking averaged 32.7 seedlings per square foot for small seed, 36.2 for medium seed, 36.0 for large seed, and 31.5 for unsorted seed. These differences in stocking were not statistically significant. Thus, survival in the nursery bed was independent of seed size.

Yield and size of seedlings.—No consistent trends in size of seedlings or yield of plantable seedlings were associated with seed size (Table 2). Small seed produced significantly fewer plantable seedlings than either medium, large, or unsorted seed, but differences in yields from medium, large, and unsorted seed were not significant. Sorting the seed did not produce any increase in the total weighted yield of plantable seedlings. The 73 percent plantable production from beds seeded with unsorted seed was 2 percentage points higher than the weighted average plantable production when the three sizes of seed were sown separately. In other words, seedlings from various sizes of seed grew just as well in mixture as when kept separate.

The inferior performance of small seed in the nursery is also reflected in the average size of bed-run and plantable stock (Table 2). Bed-run seedlings from small seed were 0.05 to 0.15 foot shorter than those from the other size classes and were 1/64 to 2/64 inch smaller in root collar diameter. Plantable seedlings from small seed were also smallest, but the differences were less pronounced. Medium-size seed produced bigger stock, both bed-run and plantable, than large and unsorted seed. In this respect, unsorted seed was superior to large seed.

Field survival.—Field survival at the end of the first growing season was generally good. With both graded and bed-run stock, survival increased as the size of seed decreased (Table 3). Unsorted seed had the lowest survival of all seed lots. Differences in survival of plantable seedlings from small, medium, large, and unsorted seed were not significant, and the maximum range was only 4 percentage points. The maximum range in survival of bed-run seedlings from mixed and sorted seed was 9 percentage points; analysis of variance showed the differences to be statistically significant, but of little practical importance.

The weighted average survival of plantable seedlings from sorted seed was 95 percent as compared to 92 percent for stock from unsorted seed. With bed-run seedlings, the averages were 91 percent for sorted seed and 87 percent for unsorted seed. Thus, the maximum benefit derived from sorting was only 4 percentage points with bed-run seedlings.

Unpublished data from a somewhat similar study at the Southern Institute of Forest Genetics[1] substantiated the observation that seed size has no notable effect on survival of outplanted slash pine seedlings.

As mentioned previously, site quality had no important influence on field survival under the favorable weather of 1958-1959 in central Louisiana.

Growth.—During the first season in the field, seedlings from medium-size seed lost much of the superiority in height that they had gained in the nursery. Whereas bed-run nursery stock from me-

TABLE 2.—YIELD AND SIZE OF SLASH PINE SEEDLINGS BY SIZE OF SEED

Class of seed	Total seedlings per sq. foot of nursery bed at lifting		Size of bed-run stock		Proportion plantable	Size of plantable stock[1]	
	Desired	Actual	Root-collar diameter	Ht.		Root-collar diameter	Ht.
	Number		*Inches*	*Feet*	*Percent*	*Inches*	*Feet*
Small	40.0	32.7	8/64	0.51	59	10/64	0.55
Medium	40.0	36.2	10/64	.66	78	11/64	.69
Large	40.0	36.0	9/64	.56	73	11/64	.58
Unsorted	40.0	31.5	10/64	.61	73	11/64	.64

[1]Morphological grade 1 and 2 seedlings combined.

TABLE 3.—SEEDLING SURVIVAL AND HEIGHT AFTER ONE YEAR IN THE FIELD

Class of seed	Bed-run stock		Plantable stock	
	First-year survival	Avg. height of survivors	First year survival	Avg. height of survivors
	Percent	*Feet*	*Percent*	*Feet*
Small	96	0.95	96	1.04
Medium	90	1.04	94	1.14
Large	88	.96	94	1.04
Unsorted	87	1.01	92	1.12

[1]Allen, R. M.

dium seed averaged 0.10 and 0.15 foot taller than stock from large and small seed, the advantage had diminished to 0.08 and 0.09 foot one year after planting. The difference between seedlings from medium and unsorted seed had also diminished. None of the differences are statistically significant, and all will probably disappear after two or three years. In the study at the Southern Institute of Forest Genetics seed size did not significantly affect height one and two years after planting.

Bed-run seedlings from unsorted seed averaged 1.01 feet in height one year after planting (Table 3). The mean height of bed-run seedlings from sorted seed, weighted by the proportion of the total number of seed in each class, was 1.00 foot. Thus, the seedlings continued to develop at similar rates whether grown from sorted or unsorted seed.

Discussion and Conclusions

As nearly as can be determined the slash pine seed used in this study produced the same numbers of plantable seedlings when sown as a composite as when small, medium, and large size components were sown separately and a weighted average was computed. Plantable seedlings from all separates survived about equally well, and the differences in survival of bed-run seedlings from sorted and unsorted seed were too small to indicate any real advantage from sorting. Growth of survivors during the first year eliminated much of the height difference present when the stock was lifted from the nursery. As previously noted, laboratory and nursery germination were not influenced by seed size.

The most striking experimental result was the superior initial growth of seedlings from medium seed. With other species, large seeds have usually produced the largest seedlings. This and the other relationships between seed size and initial growth of slash pine are of interest to research workers who sometimes must evaluate differences in heights of very young seedlings. These considerations, however, should not obscure the fact that differences are small and will probably disappear after two or three years. The practicing nurseryman or forester may continue to use unsorted slash pine seed with confidence.

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Southern Forest Tree Improvement Conference

The Sixth Southern Forest Tree Improvement Conference will be held at the University of Florida, Gainesville, June 7-8, 1961.

Ninth Northeastern Forest Tree Improvement Conference

The Ninth Northeastern Forest Tree Improvement Conference will be held on the campus of the New York State University College of Forestry at Syracuse University, August 23-24, 1961. The program will include a field trip through the Syracuse Forest Experiment Station to see a demonstration of work conducted by the College of Forestry in forest tree improvement and particularly the elm test area, and a tour of the new Baker Laboratory. There will be optional trips to the Pack Demonstration Forest at Warrensburg and the New York State Nursery at Saratoga Springs.

Fifth Lake States Forest Tree Improvement Conference

The Fifth Lake States Forest Tree Improvement Conference will be held at Rhinelander, Wis., September 19 and 20, 1961. The conference will serve also as the technical session for the Wisconsin-Michigan Section of the Society of American Foresters. The conference will include technical papers for about a half day and field visits to the Northern Institute of Forest Genetics and other points of forest tree improvement interest for about 1½ days. Additional information can be obtained from the program chairman, John W. Macon, Consolidated Water Power and Paper Co., Rinelander, Wis.

Prevention of Insect Damage to Decked Pine Sawlogs in Massachusetts With BHC Emulsion Sprays[1]

W. B. Becker and H. G. Abbott

SINCE Johnston and Kowal (*7*) first published on the use of benzene hexachloride (BHC) in oil for the prevention of ambrosia beetle attack on unseasoned logs and lumber in the southeastern United States, several authors have published on the results of log spraying tests against various bark and wood boring insect pests of unseasoned logs in the United States and Canada.

In Massachusetts, where the adults of such insects do not fly during the late autumn, winter, and early spring months, BHC emulsifiable liquids, diluted in water to 0.4 percent gamma isomer content by volume and sprayed on the entire surface of individual pine logs in the early spring, have given complete to practically complete protection until the next winter against all available insect pests of unseasoned pine logs. Such results have been obtained consistently since 1948 (*3, 4, 5, 6*). When applied properly in sufficient volume to the outer surfaces of piles of pine cordwood, without disturbing the piles, protection still has been excellent (*3*).

With this background, it seemed desirable to determine if pine sawlogs, which are to be left outdoors from spring to autumn in Massachusetts, could be adequately and economically protected against insect damage by spraying an entire deck *in situ* with a BHC emulsion without handling logs individually.

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The authors are deeply indebted to the Massachusetts Department of Natural Resources, the Wackerbarth Company at Granville, and the Fessenden Companies, Inc., at Townsend, for providing and sawing the logs for these tests.

[1]Contribution No. 1234 of the Mass. Agric. Expt. Sta. and Entomological Contribution No. 1330 from the Department of Entomology and Plant Pathology of the University of Massachusetts.

Procedure

Spraying.—Before insects attacked them in the early spring, roadside or mill yard decks of recently cut, unseasoned eastern white pine (*Pinus strobus* L.) logs, were sprayed with a 0.4 per cent (by volume) gamma isomer content BHC emulsion. This spray was prepared before each test by diluting in water a commercially available 11.8 percent gamma isomer content BHC emulsifiable liquid. Spray was applied over the top and all sides of each deck, including the exposed underside of skidways on slopes, until it began to run off log surfaces. All log surfaces were dry before being sprayed and no rain fell until after the spray residue dried. Spray also was directed into openings among the decked logs. The objective was to prevent any insects from flying to or crawling onto a deck of logs without first touching a sprayed surface where the BHC residue acts as a contact poison. Tests were conducted in 1956, 1957, and 1958 at widely separated localities.

One man sprayed while another pointed out spots which needed respraying and kept the spray hose from becoming tangled. Figure 1 shows a typical spraying operation.

Equipment.—Both large and small, motor driven, hydraulic sprayers were used. With large sprayers used for orchard or shade trees (pump capacity 35 to 60 g.p.m.), the output of spray was reduced with a number 8 spray disk to enable the spray man to wet log surfaces to the point of run-off in approximately the same time he needed to achieve complete spray coverage. This provided proper spray coverage with a minimum waste of time and spray. An adjustable spray gun produced a broad or narrow spray pattern as desired. The 300 to 500-gallon spray tanks made it unnecessary to take time to refill them during any test.

A small sprayer with a 3 g.p.m. pump capacity, a number 5 spray disk, and a 15 gallon tank was used for one deck at Wendell. In comparison with the large sprayers, the slower output of spray, narrower spray pattern, and small tank (which needed refilling at frequent intervals) resulted in a smaller volume of logs being sprayed per hour. The spray hose on all sprayers was long enough to reach all parts of a deck without moving the spray rig.

Examinations. — Log surfaces were examined for evidence of insect attack during the late spring and summer but the decks were not disturbed until the following autumn or winter when all logs were sawed into lumber. Later the same winter the lumber was graded by an experienced lumber grader in accordance with standard grading rules (*1*). In this experiment, square edge boards were graded as such but round edge boards, which were examined before being edged, were graded on the basis of their estimated square edge yield.

Each insect-damaged board was given two grade designations: (1) the grade in which it *would have been* placed if no worm holes had been present and (2) the grade in which it *was* placed because of worm holes. With those data, the value of the lumber and also the

monetary loss from downgrading due to worm holes can be estimated from current price quotations for the various grades.

For these tests, values and losses were based on average f.o.b. wholesale price quotations for grades D Select and better down through No. 4 Common (standard) in the October 11, 1958, issue of the *Commercial Bulletin* (*2*). The price of No. 5 Common (industrial) was based on reliable estimates by several New England lumbermen because no prices were quoted for this grade in the *Commercial Bulletin*.

Insects Causing Damage

At all three test sites, roundheaded borers (Cerambycidae), especially pine sawyer beetles, (*Monochamus* spp.) were the principal cause of the "large worm holes" mentioned in the lumber grading rules. The ambrosia beetle, *Gnathotrichus materiarius* Fitch (Scolytidae) was the cause of the "pinworm holes" cited.

Pinworm holes penetrated the xylem approximately two inches. Large worm holes usually extended much deeper into the logs and, in all instances, were blamed for downgrading more lumber than the pinworm holes. Lumbermen have long known that many boards free of both large and pinworm holes may be obtained from the inner portions of insect damaged logs of large diameter when sawing "around the log." This became increasingly noticeable in these tests with logs 15 inches and larger in diameter. Unfortunately, the better grades of lumber may be sawed from the outer portions of large logs, the same region which these insects may attack.

Results

Wendell tests.—At the Wendell State Forest, three large roadside decks of white pine logs were sprayed on May 7, 1956. These decks were 50 to 67 feet long, not over 5 feet high and produced a total of 25,590 board feet of lumber. The logs in each deck varied between 5 and 23 inches in diameter at the small end and were 8 to 12 feet long. The logging crew had been instructed to haul all logs from a given tree to the same deck in order that logs from the upper and lower trunk would be distributed equally among the decks. In November, all logs of adequate diameter and quality were sawed "around the log" on a circular saw, while the smaller and lower quality logs were generally sawed "through and through." Production consisted mostly of one-inch boards but a few 2¼ inch planks and smaller dimension stock were also produced.

FIG. 1.—Spraying typical of that done in these tests. *Top*, Spraying top of deck. *Bottom*, Spraying side of deck.

Examination of the lumber revealed no downgrading losses due to worm holes in two of the three sprayed decks, indicating complete protection against insect damage. In the third sprayed deck, only one board which contained 4 board feet of lumber (approximately 0.4 board feet per M) was downgraded from No. 4 to No. 5 Common because of large worm holes. This constituted a loss of less than two cents per M board feet for this one deck.

In the unsprayed deck which was 36 feet long, not over 5 feet high, and produced 4,688 board feet of lumber from logs 5 to 23 inches in diameter at the small end, downgrading due to worm holes resulted in a loss of $20.73 per M board feet or 20.6 percent of the f.o.b. wholesale value of the lumber if no worm holes had been present.

At 1958 prices, the approximate f.o.b. retail cost of the insecticide used to spray these three decks varied between $0.75 and $0.89 per board feet, the exact price varying inversely with the amount of BHC purchased. Approximately the same amount of water-diluted spray was used per board feet with both large and small power sprayers previously described. With a

large sprayer, 7.9 and 8.7 gallons per M were applied on two decks. With the small sprayer 7.9 gallons per M were used on the remaining deck. This averaged 8.2 gallons per M board feet for the test.

With a large sprayer, two of the three decks (8,257 and 9,738 board feet) were sprayed at an average rate of 16.9 M board feet an hour. With the small sprayer, the third deck (7,595 board feet) was sprayed at a noticeably slower rate which unfortunately could not be accurately estimated because of part-time malfunctioning.

Granville test.—At a mill yard in Granville, one deck of logs was sprayed with a large power sprayer on April 26, 1957. This deck was about 12 feet long, almost 12 feet high (consisting of 4 truckloads of logs, each load bound by a steel tape), and produced a total of 5,236 board feet of lumber. The logs varied from 4 to 20 inches in diameter at the small end and were 6 to 14 feet long. In March of 1958, all logs were sawed through and through on a gang saw into round edge planks 1⅞ inches thick.

Examination of the lumber from the sprayed logs revealed no downgrading losses due to worm holes, indicating complete protection against insect damage.

In an unsprayed deck, which produced 896 board feet of lumber from logs 5 to 18 inches in diameter at the small end, downgrading due to worm holes resulted in a loss of $15.46 per M board feet or 16.5 percent of the f.o.b. wholesale value of the lumber if no worm holes had been present.

At 1958 prices, the approximate f.o.b. retail cost of insecticide for this application varied between $0.78 and $0.94 per M board feet, dependent upon amount purchased. Eight and six-tenths gallons of water-diluted spray were used per M board feet. This deck was sprayed at the rate of about 10.5 M board feet an hour.

Townsend test.—At a mill yard in Townsend, a deck of logs was sprayed with a large power sprayer on April 24, 1958. This deck was about 15 feet long, not over 5 feet high and produced 1,977 board feet of lumber (mill scale). The logs varied from 4 to 14 inches in diameter at the small end and were 8 to 16 feet long. In October all logs of adequate diameter and quality were sawed around the log on a single band saw into one-inch boards while logs of smaller and lower quality were sawed through and through.

Examination of the lumber from the sprayed logs revealed only 13 board feet per M board feet downgraded from No. 4 to No. 5 Common because of large worm holes. This constituted a loss of only $0.52 per M board feet or approximately 0.5 percent of the f.o.b. wholesale value of the lumber if no worm holes had been present.

In the unsprayed check pile, which produced 949 board feet of lumber from logs 4 to 14 inches in diameter at the small end and 8 to 14 feet long, downgrading due to worm holes resulted in a loss of $29.92 per M board feet or 29.8 percent of the f.o.b. wholesale value of the lumber if no worm holes had been present.

At 1958 prices, the approximate f.o.b. retail cost of insecticide for this application varied between $0.92 and $1.10 per M board feet dependent upon amount purchased. Ten and one-tenth gallons of water-diluted spray were used per M board feet. This deck was sprayed at the rate of about 10.8 M an hour.

Detailed data from all three test sites on the amounts of lumber involved, grade yields, values, and downgrading losses (based on October 1958 prices) are compared in Table 1. Changes in the prices of the different grades of lumber

TABLE 1.—COMPARISON OF THE GRADE YIELD, VALUE, AND DOWNGRADING LOSSES DUE TO WORM HOLES IN LUMBER SAWED FROM SPRAYED AND UNSPRAYED DECKS OF EASTERN WHITE PINE LOGS (*Pinus strobus* L.) IN MASSACHUSETTS. (DECKS SPRAYED IN EARLY SPRING WITH A 0.4 PERCENT GAMMA ISOMER CONTENT BHC EMULSION AND LEFT OUT DOORS UNTIL AUTUMN OR WINTER)

Treatment	Bd. ft. of lumber from logs	Grade yield per M.B.F. D Select & better	No. 1 & 2 Common (Finish)	No. 3 Common (Premium)	No. 4 Common (Standard)	No. 5 Common (Industrial)	Total value per M.B.F.	Losses per M.B.F. due to worm holes Cash	Percent
Average f.o.b. wholesale prices (Oct. 1958) of each grade per M.B.F.		$200	$160	$125	$90	$50			
1956 Wendell State Forest test									
Sprayed Deck X	8,257	32	18	145	765	40	$ 98.26	$0	0
Sprayed Deck Y	7,595	12	36	164	750	38	$ 97.61	$0	0
Sprayed Deck Z	9,738								
(If worm holes absent)		17.8	19.5	187.7	698.5	76.5	$ 96.833	---	---
(With worm holes present)		17.8	19.5	187.7	698.1	76.9	$ 96.817	$ 0.016	0.017
Unsprayed Deck	4,688								
(If worm holes absent)		38	17	169	757	19	$100.23	---	---
(With worm holes present)		11	9	80	529	371	$ 79.80	$20.53	20.6
1957 Granville Mill Yard test									
Sprayed Deck	5,236	4	5	261	719	11	$ 99.49	$0	0
Unsprayed Deck	896								
(If worm holes absent)		0	0	109	891	0	$ 93.82	---	---
(With worm holes present)		0	0	73	572	355	$ 78.36	$15.46	16.5
1958 Townsend Mill Yard test									
Sprayed Deck	1,977[1]	(Worm-hole-free lumber from this deck was not graded)[2]					---	$ 0.52	0.5[3]
Unsprayed Deck	949								
(If worm holes absent)		0	21	316	612	51	$100.49	---	---
(With worm holes present)		0	8	103	299	590	$ 70.57	$29.92	29.8

[1]Mill scale.
[2]Only 13 board feet per M.B.F. were downgraded from No. 4 to 5 Common due to worm holes.
[3]Assuming the original grade yield of lumber, without worm holes, averaged the same as the unsprayed deck.

would naturally cause variations in the amount of such losses.

Discussion

Under the grading rules (*1*), a given amount of insect damage can cause greater downgrading losses to high grade lumber than to lumber originally of lower grade. Losses may also vary with the extent of insect damage.

As regards spraying, the amount of spray used per M board feet and the volume of logs sprayed per hour can vary with the skill of the spray man and possibly with the size, form and arrangement of the decks. Improvements in spraying skill, technique, or equipment could reduce costs. Of course, if an application is too light or gives incomplete coverage, good protection may not result. Besides, opening a deck after spraying could expose to beetle attack partly sprayed or unsprayed logs from the interior of the deck.

Other operational factors, not considered in these experiments but which would affect the cost of control, include the time to fill, refill, and clean the spray rig and move it from deck to deck. These factors would vary with the distance to a water supply, the size of the spray tank, and the location and arrangement of the decks.

Like most insecticides, BHC is poisonous, being somewhat comparable to DDT in this respect, so appropriate precautions were observed when spraying. Test sites were not established on land used for domestic animals, crops, or pastures, or close to water. BHC has a musty odor which, for a few weeks after an application, could readily be detected a few yards from sprayed decks in calm air and somewhat farther downwind. This may be objectionable to some people for a while. By autumn, the odor was only faintly noticeable among the logs. Lindane, the purified and much less odorous form of BHC, would have cost approximately two and a half times as much as the BHC spray.

BHC, as used in agriculture, has affected the taste of some food crops. Consequently, when sawing logs which have an odorous BHC residue, it may be unwise to use the ground-up bark, slabs, and other waste as a mulch on food crops or for other purposes where this residue is undesirable.

Summary

In three widely separated towns in Massachusetts, a total of five decks of winter-cut, eastern white pine sawlogs were sprayed once with a 0.4 percent gamma isomer content BHC emulsion before insects attacked in the early spring. Each deck was sprayed as a unit. The treatment gave excellent protection against damage by wood boring insect pests of unseasoned logs until the next winter when the logs were sawed and the lumber graded.

In the five sprayed decks, lumber downgrading losses due to worm holes varied from nothing to \$0.52 (0.5 percent) per M board feet. The lumber from each deck was estimated to be worth \$96.82 to \$99.97 per M board feet, based on average f.o.b. wholesale price quotations in October 1958. In the unsprayed deck, at the three test sites, such losses varied from \$15.46 (16.5 percent) to \$29.92 (29.8 percent) per M board feet, the resultant lumber from each deck being worth \$70.57 to \$79.80 per M. Large worm holes caused a greater volume of downgrading than pinworm holes.

The minimum and maximum cost of the insecticide varied from approximately \$0.75 to \$1.10 per M board feet in the various tests. Individual decks were sprayed with a large power sprayer at the rates of 10.5 to 16.9 M board feet per hour. With a two-man crew, one man spraying and another assisting, this amounted to 5.25 to 8.45 M board feet per man-hour or approximately 0.19 to 0.12 man-hours per M.

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Crown Development and Its Effect on Stem Growth of Six Douglas-Firs[1]

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TO MANAGE Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) forests intensively, foresters need to more fully understand how individual trees grow. As a step in this direction, the life histories of six dominant trees were reconstructed through stem and branch analysis in 1956 to gain insight into the effects of crown development on growth.

The trees studied, varying in age from 36 to 70 years at stump height (Table 1), were located on two areas in western Washington: McCleary Experimental Forest, near McCleary, and Lee Forest, near Maltby.[2] At the time of the study, the trees were growing under somewhat varying stand conditions, but all on site II land. They were thought to have been dominant during most of their lives. Coarsely branched trees were studied, because crown development can be most readily reconstructed on such trees.

Procedure

To reconstruct crown development, all dead branches and some lower live branches were collected from each tree (Fig. 1). These branches—recorded by quadrant in which located (NE., SE., SW., NW.), whorl number, and height to whorl from the ground—were cut off flush with the tree stems. Branch cross sections, taken from the basal end, were polished to facilitate ring counts made with the aid of a low-power lens. From this information, the pattern of crown dieoff and the ratios of number of live whorls to tree age were determined for each tree. Branch diameters were also measured and rate of branch radial growth calculated.

Radial development was reconstructed at several points along the stem of each tree, either from increment cores or by felling the trees and taking stem cross sections. In addition, total height of each tree was measured.

In this study, the age at which a branch ceased to produce a distinguishable growth ring was considered the time of death, since it was probably no longer a part of the functional crown. Examination had revealed discrepancies between number of annual rings at the bases of lower live branches and in tree stems at their points of intersection (*10*). Similar discrepancies have been observed on other species (*1, 3, 11*). Probably this condition is due to failure of branches to form distinguishable growth rings during the latter years of life, and it can be assumed that discrepancies of a like nature also existed in ring counts on dead branches.

Results and Discussion

Because only six trees were studied, the interpretations that can be drawn from the data are limited. Nevertheless, the study brings out several interesting relationships and in addition provides leads for further research.

Whorls were found generally to die at a uniform rate up the tree stem. Time of beginning and rate of dieoff varied somewhat from one tree to another depending upon growing conditions. The ratio of number of live whorls to tree age (whorl/age ratio) is one expression of the pattern of crown dieoff. This ratio dropped below 40 percent on only two trees—on one it dropped just slightly below and then increased, and on the other it leveled off at about 30 percent (Fig. 2). Fire at age 10 caused the irregularity shown for tree No. 3. The increase in ratio of tree No. 4, beginning at age 45, was due to branch longevity increasing at a more rapid rate than previously. For the trees studied, this ratio is only slightly higher than crown ratio.

The variation in number and size of branches per whorl was greater between trees than within individual tree crowns. Average number of branches per whorl ranged from 3.4 to 10.8, and diameter from 0.8 to 2.1 inches. The increase in branch longevity with

TABLE 1.—LOCATION, AGE, AND SIZE OF STUDY TREES

Tree number	Forest	1956 data			D.b.h. at age 35[2]
		Age[1]	D.b.h.	Height	
		Years	*Inches*	*Feet*	*Inches*
1	McCleary	70	34.2	146	24.5
2	McCleary	58	29.9	152	21.2
3	Lee	51	26.5	117	16.7
4	McCleary	60	22.6	145	14.4
5	Lee	36	15.6	102	14.3
6	McCleary	55	16.9	121	13.2

[1]At stump height.
[2]Diameter inside bark.

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[1]Developed from a thesis "A study of the interrelationships between growing space, crown development, and stem development of second-growth douglas-fir" (1957) written in partial fulfillment of the requirements for the degree of Master of Forestry, University of Washington.

[2]McCleary Experimental Forest is maintained jointly by the Simpson Logging Co. and the U. S. Forest Service; Lee Forest is maintained by the College of Forestry, University of Washington.

FIG. 1.—As a preliminary to crown reconstruction, all dead and lower live branches were collected from each study tree. This is tree No. 1 at McCleary Experimental Forest.

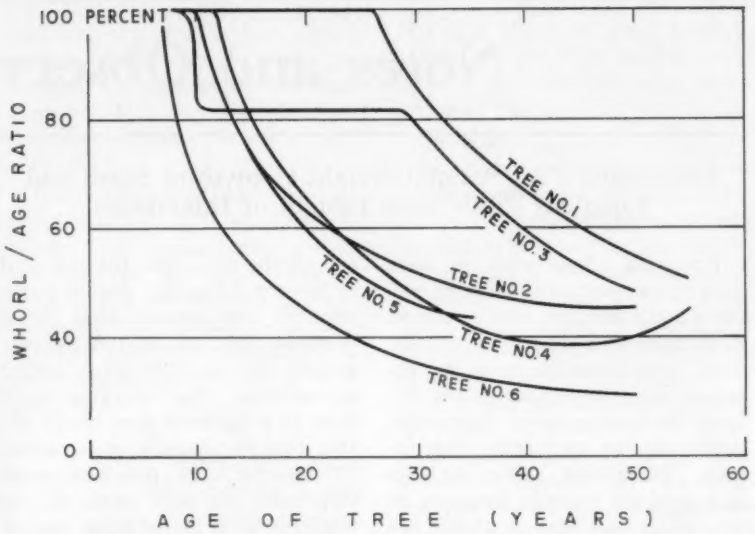

FIG. 2.—Change in the ratio of number of live whorls to tree age (at stump height) for each of the study trees. The irregularity in crown development of tree No. 3 is due to fire injury at age 10.

branch height was balanced by slight decreases in branch radial growth, so that the diameters of the branches at time of death were nearly the same on all whorls of any individual tree.

Rate of stem diameter growth has frequently been observed to be associated with crown size (*2, 4, 6, 7, 8, 12, 13, 14*). The trees in this study reflected this correlation in a general way, but a great deal of variation was found in the relation between crown length and stem growth. When number and size of branches were considered along with crown length, the relation to stem growth was no better than when crown length alone was considered. Time of beginning and rate of crown dieoff have strong influence on increases or decreases in rate of stem basal-area growth. It appears to be the entire history of crown development, rather than crown size at any given time, that is important.

Regarding stem form, growth rings were widest near the base of the stem when the trees were young. As the trees became older there was a continual upward shift in the position of maximum ring width. This is consistent with observations on other species (*5, 9*). It is of interest that for all six trees, diameter of the stem at the base of the live crown remained nearly constant as its position moved up the stem. Thus, there was a relation between rate of crown dieoff and amount of stem taper.

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Notes and Observation

Estimating Past Annual Height Growth of Slash and Longleaf Pines from Length of Internodes

Foresters often wish to have data of past annual height growth for plantations on which annual measurements have not been made. Such measurements may be obtained easily by measuring the distance between primary internodes. Although the southern pines exhibit multinodal characteristics and produce variable numbers of internodes and branch whorls per year, Wakeley and Marrero[1] have been successful in identifying and measuring internodes to evaluate the site quality of pine plantations less than 20 years old.

Technique

The authors used an extendable aluminum pole with a maximum extended length of 45 feet to make the measurements. A 50-foot metallic cloth tape graduated in feet and tenths of feet was attached to the end of the pole with the zero end at the top (Fig. 1). Actual measurement was accomplished by a two-man crew, one holding the pole against the tree, the other acting as tallyman. The tallyman stood back at a distance that would enable him to identify each successive internode. The pole man would then raise the pole until the tip was even with the terminal bud of the tree, and the tape reading at a reference mark on the body of the pole was recorded. On instruction from the tallyman the pole was lowered until the tip of the pole was even with the primary whorl of branches which represented the end of the previous year's growth. The tape was again read at the reference point. The difference between the two readings represents the growth which occurred in the previous growing season. Repetition of this procedure for successive internodes allows both dating and measurement of past annual height growth.

[1]Wakeley, P. C., and José Marrero. Five-year intercept as site index in southern pine plantations. Jour. Forestry 56: 332-336. 1958.

Limitations

Limitations of this technique are imposed by the length of the measuring pole and the height of the tree being measured. It was found that accurate measurements were not attainable above a height of 40 feet because of the inability of the tallyman to distinguish clearly the internodes at that height. On trees 15 years old approximately 8 to 10 years past growth could be estimated with ease.

Past infestations of the Nantucket tip moth (*Rhyacionia frustrana* Comst.) occasionally obliterate internodes beyond recognition in loblolly or shortleaf pine plantations.

Accuracy

A study was initiated by the authors to investigate the accuracy with which past annual height increment may be estimated from length of internodes. Two plantations were located on which height measurements had been made annually for several years and kept separate by individual, tagged trees.[2] One was a 23-year-old long-

[2]The authors are indebted to P. C. Wakeley and Lloyd F. Smith, Southern Forest Expt. Sta., Forest Service, U. S. Dept. Agric., for their aid in securing the original field data used as a comparison in this study.

FIG. 1.—Extendable height pole used in making the internodal measurements, with a 50-foot tape attached to the top.

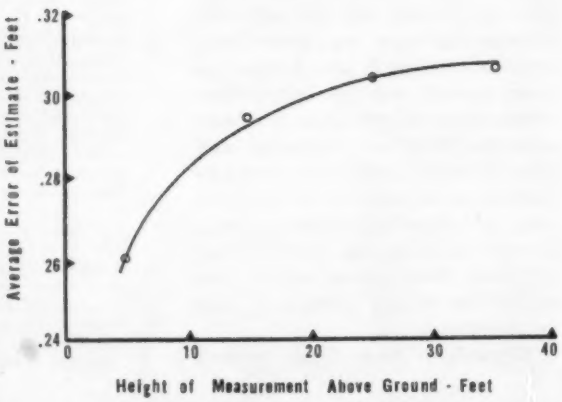

FIG. 2.—Relationship between average error of estimate of the internodal measurement and the height at which the measurement was made.

leaf plantation which yielded 63 observations, while the second was a 13-year-old slash plantation in which 61 observations were made.

Field measurements of past annual height increment were made from length of internodes on individual trees and compared with the original field measurements. There was negligible difference between the two species in the accuracy with which actual height growth may be estimated from internodal distance. Thus, for the purpose of testing the efficiency of this technique, the data for both species were combined and analyzed. Annual height growth of the 124 combined observations ranged from 1.5 to 4.9 feet, averaging 3.4 feet. Average error and standard error of estimate were ± 0.28 feet and ± 0.36 feet, respectively. The average error constituted 8.3 percent of the mean annual height growth, while the standard error or estimate was 10.3 percent.

When the combined internodal measurements were stratified by height of measurement above ground, the average error increased as a second-order function of the height of measurement (Fig. 2). The resulting increase, however, was not large enough to be important.

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A Photo-Optical Method for Determining Gross Characteristics of Wood[1]

Studies of wood sometimes require that superficially visible characteristics, such as annual increment width, width of latewood, or relative proportions of tissues in latewood of hardwoods be quantitatively compared.

Various methods have been suggested for making these determinations,[2, 3] their utility being somewhat dependent upon laboratory facilities available, since most require the preparation of microscopic slides. This note presents a simple method developed while examining tissues of red oak which is economical and does not involve the preparation of microscopic slides.

The wood specimen is smoothed by a series of wet sanding operations, using successively finer grits of wet or dry abrasive paper. A final polishing with number 600-A silicon carbide paper produces surfaces of such smoothness that much detail is visible under low power magnification (Fig. 1).

The polished surfaces are then photographed using Kodak Direct Positive Film, which is particularly well adapted because of its inherent high contrast and fine grain. The fact that the film is available in 35 mm. × 100 foot rolls contributes to the economy and convenience of this method.

Specimens up to 25 × 35 mm. may be photographed at 1:1 ratio which is convenient for later work, but other reproduction ratios may be used as long as they are known. When using a 100 watt microscope illuminator without filters at a distance of 14 inches, ¼ second at f 32 produces negatives of the proper density. The film may be developed in any suitable high contrast developer such as Kodak D-11. Such a developing process is more convenient than the reversal development procedure. The negative when cleared, washed, and dried provides a permanent record of the configurations visible on the surface.

In addition to the usual techniques for further study, such as making enlarged prints at predetermined ratios, a projector adapted for 35 mm. roll film may be employed for projecting images on either a white surface or ground glass from which measurements are then conveniently made. With a ground glass screen it is possible to project the images on the surface opposite the measurer whose form can then cast no shadows.

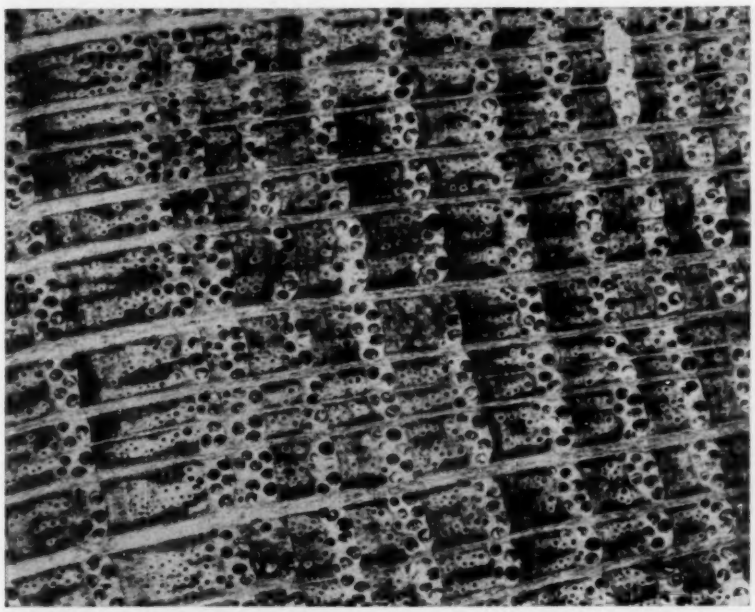

FIG. 1.—Example of surface obtainable using a series of wet sanding operations on oak.

[1]This research was performed under the cooperative agreement between the Southeastern Forest Expt. Sta., North Carolina State College, University of Georgia, and the Georgia Forest Research Council.

[2]Cheo, Y. Relationship of wood structure to the toughness of red oak. Unpublished M.F. thesis, Yale University, New Haven, Conn. 1948.

[3]Echols, R. M. The Ampliscope—an instrument for wood-fiber measurement. Jour. Forestry 57:43-44. 1959.

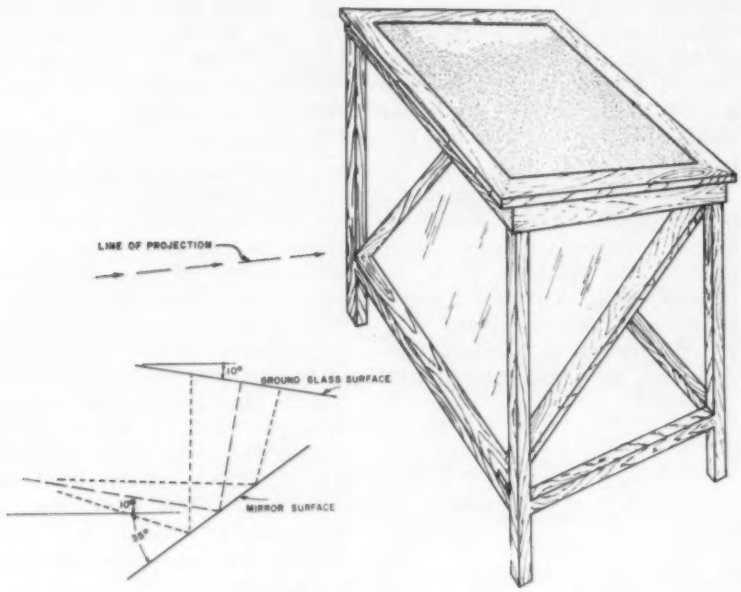

FIG. 2.—Diagram of projection booth used for tracing images from projected negatives.

In order to facilitate the projection of images and to standardize their subsequent measurement, it may be desirable to construct a booth for supporting the ground glass, inclined at a comfortable angle from a horizontal plane, (Fig. 2). If a projection lens of normal focal length is employed, the projector must be placed at some distance in front of (depending on the magnification desired) and at right angles to the ground glass screen. The addition of a mirror to the optical system permits a change in direction of the projected light and thus a more convenient arrangement of the components. A first surface coated mirror would be desirable; however, a cheaper plate glass mirror was found to be satisfactory although double images resulting therefrom are visible, but not distracting. Shielding the mirror and lower side of the ground glass helped to obtain a distinct image. With a low wattage projector, in a lighted room, a hood placed above the operator eliminates surface reflections which tend to obscure the projected image.

When the reproduction ratio of the negative is known, any desired magnification of the negative may be obtained by changing the distance between projector and ground glass. The degree of magnification is limited by the wattage of the projector and the size of the mirror and ground glass.

If the number of specimens is large, the complete enumeration of their surfaces may become quite time consuming, thus it may be desirable to sample the surface being studied. This photo-optical method leads itself well to the use of sampling subunits as a grid of any size may be drawn on the ground surface of the glass. Small pieces of tracing paper may be attached with pressure sensitive tape over the sample subunits to be examined. The image of the wood surface is visible through the tracing paper and an outline of the surface configurations may then be traced directly on the paper for subsequent measurement. Or, if desired, measurement may be made directly on the ground glass.

This procedure is quite flexible, and the laborious slide cutting and staining procedure is eliminated. Expensive optical equipment is not permanently mounted in the system, but is readily available for other uses.

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Thrips Injure Slash Pine Female Flowers

During the period 1958 to 1960, damage to slash pine (*Pinus elliottii* var. *elliottii* Engelm.) flowers and conelets by a thrips *Gnophothrips piniphilus* Cwfd.[1] has been observed in northeast Florida. Such damage by this insect has not been previously recorded. The insects fed on both scales and bracts of flowers and conelets, leaving tiny, barely visible punctures and abrasions marked by beads of resin. Severe injury caused death of scales and bracts, and often the entire flower or conelet shriveled and died (Fig. 1).

Flowers, cones, and vegetative tips of both slash pine (*Pinus el-*

[1]Identification by K. O'Neill, U. S. National Museum.

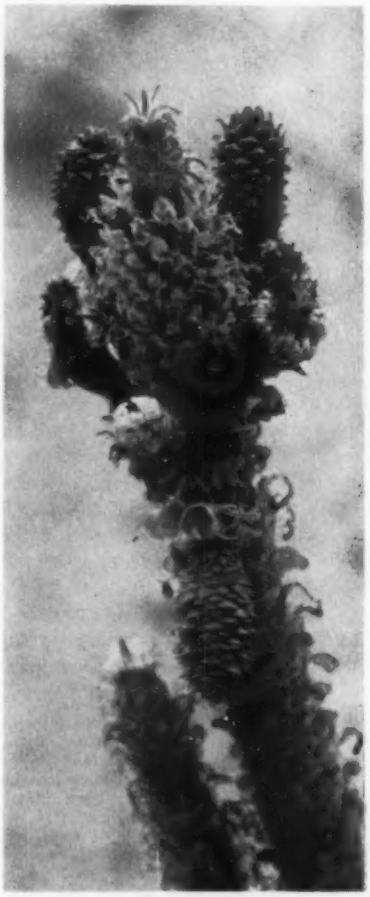

FIG. 1.—Three conelets killed by *Gnophothrips piniphilus* compared to three normally developing conelets. Characteristic resinosis is obvious on dead conelets.

liottii Engelm.) and longleaf pine, (*P. palustris* Mill.) were collected within a 15- to 20-mile radius of the Olustee Experimental Forest near Lake City, Florida, during the period from January 1958 to April 1960. This material was examined to identify the insect species which contribute to cone or seed losses of the two pines. *Gnophothrips piniphilus* was among the insects found on the slash pine material. It is a comparatively large thrips, one-sixteenth of an inch long, and very dark brown or black.

The insect was found in early January on vegetative buds; was common during February on female flowers or flower buds and on vegetative buds; and continued to appear on young cones and vegetative buds or shoots until mid-May. Serious damage, however, appeared to be restricted to developing flowers and very succulent young cones immediately following flowering. No damage to shoots was noticed, but Crawford[2] and others[3 4] have reported that this thrips causes needle damage to ornamental pine nursery stock. Their reports indicate that the insect can also feed on vegetative growth.

In the course of observations of insect damage to flowers and cones of slash pine, thrips damage was found to range from negligible to as high as 20 percent mortality. During 1959, 14 open-grown trees, averaging 45 feet in height, were sampled for thrips activity. Twenty flower-bearing branchlets were examined on each tree. Noticeable attack was found on 14.3 percent of the 672 flowers on the sample branches on February 26. By April 8, flower and conelet mortality attributed to thrips was 6.1 percent of the total flowers. This was 42.7 percent of those recorded as attacked in February. While the effect of nonlethal thrips damage on seed production was not checked, additional loss of seed would be expected where individual cone bracts or scales are killed but the cone survives.

B. H. EBEL

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[2]Crawford, J. C. Some new or little known Thysanoptera. Ent. Soc. Wash. Proc. 40(2): 35-43. 1938.

[3]Rhode Island Dept. Agric. and Conservation Report 9. p. 48. 1943.

[4]Rhode Island Dept. Agric. and Conservation Report 10. pp. 55-56. 1944.

Larch and Lodgepole Pine Dwarfmistletoes Attack Scotch Pine

A recent examination of severe brooming in planted Scotch pine (*Pinus sylvestris*) revealed dwarfmistletoe infection. This is believed to be the first report of any mistletoe (including both the true and dwarf species) on Scotch pine in North America.

No record of dwarfmistletoe occurrence on Scotch pine anywhere in the world was found in the literature. However, in its native range in Europe, Scotch pine is occasionally attacked by the leafy mistletoes. *Viscum album* has been reported to occur sparingly on Scotch pine in the Innsbruck Botanical Garden, Switzerland (*3*). Boyce (*1*) has observed *Viscum* spp. on Scotch pine in Germany. Tubeuf (*5*) states that "in the warmer climatic situations of Europe, Scotch pine may become heavily infected with *V. album* var. *pini* in nature."

The Scotch pines were planted about 55 years ago in a single row along the edge of a homestead clearing located about 25 miles southeast of Colville, in northeastern Washington. The trees vary considerably in size; the largest ones are about 50 feet in height and 10 inches in diameter.

All 13 of the larger Scotch pine

FIG. 1.—Group of Scotch pines infected with the larch dwarfmistletoe. There is a large amount of brooming and some branch mortality.

trees (6.1 to 10.5 inches d.b.h.) are infected with dwarfmistletoe, and 31 of the 36 smaller trees are infected.

The five uninfected trees are greatly suppressed—almost completely hidden and overtopped by larger trees. Most of the infected trees have multiple infections and witches-brooms (Fig. 1). Some of the trees do not have a single normal branch.

Two sources of native infection are within range of the Scotch pine. Several western larch (*Larix occidentalis*) overstory trees located immediately behind the row of Scotch pines are heavily infected with the larch dwarfmistletoe, *Arceuthobium campylopodum* f. *laricis*. Several lodgepole pines (*Pinus contorta*) infected with the lodgepole dwarfmistletoe, *A. americanum*, are also nearby, and the branches of one of these infected lodgepoles touch the branches of two Scotch pines.

Field and laboratory examinations of the dwarfmistletoe plants show that the larch dwarfmistletoe is the predominant species infecting the Scotch pine (Fig. 2). Only one infection with characteristic lodgepole pine dwarfmistletoe plants was found on the Scotch pine. No differences between the shoots on the two hosts and those on Scotch pine are evident. The morphology and vigor of the dwarfmistletoe plants produced on Scotch pine are characteristic of the parasite on its usual host tree. The witches brooms on the Scotch pine resemble recently formed brooms in western larch or diffuse infections in pines, particularly lodgepole pine. This broom formation in Scotch pine is probably more dependent on host reaction than on the dwarfmistletoe species causing the brooms.

A single dwarfmistletoe species may attack several tree species, but the exact number of natural crosses among potential hosts is not known. They are believed to be few and of little consequence. Severe damage rarely occurs on species other than the primary host. The larch dwarfmistletoe has been reported to infect naturally *Picea engelmannii, Abies lasiocarpa, Pinus banksiana, P. contorta*, and *P. monticola* (*4, 2*). In all instances, these species apparently were no more than occasional hosts, for infection was limited to a single tree or at most to a few trees. Damage from these infections was minor.

FIG. 2.—Portion of Scotch pine branch showing single male shoot of *Arceuthobium campylopodum* f. *laricis*, the larch dwarfmistletoe.

From the evidence given, Scotch pine may be a more suitable host to the larch dwarfmistletoe than are native tree species reported as secondary hosts. Introduction of the larch dwarfmistletoe into Scotch pine forests of Europe and northern Asia is unlikely. However, if this parasite should be introduced into Eurasia, the pest might become well established. Spread of the larch dwarfmistletoe into Eurasia should be prevented, and Scotch pine should not be planted in the Pacific Northwest wherever dwarfmistletoe infected western larch and lodgepole pine occur.

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5. TUBEUF, K. F. 1923. Monographie der Mistle. 832 pp. Munich and Berlin: R. Oldenbourg. Charts. Illus.

DONALD P. GRAHAM and CHARLES D. LEAPHART

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A New Forest Fire Insurance Program

The insurance of both merchantable and unmerchantable timber (standing live trees) against loss by fire and lightning is currently being solicited in the Southern timber belt by the Gulf American Fire and Casualty Company of Montgomery, Alabama. The company is licensed to do business in six states (Alabama, Florida, Georgia, Mississippi, South Carolina, and Tennessee) and writes forest insurance in six other states (Arkansas, Kentucky, Louisiana, North Carolina, Virginia and West Virginia) under a "surplus line" arrangement. This provides that insurance brokers unable to find a locally licensed company to provide a particular type of insurance may place it with an unlicensed company which has registered to do business in the state on that basis.

Insurance Coverage

Gulf American recognizes four timber size classes for insurance purposes.

(a) Merchantable size trees suitable for pulpwood or saw timber; these are insured for the difference in value of the damaged trees before and after the fire allowing reasonable time for salvage.

(b) Unmerchantable size trees suitable for sawmill or pulpwood purposes and ranging from 1 inch in diameter at 6 inches above the ground to 3 inches d.b.h.; these are insured for an amount per acre specified by the policyholder up to a maximum of $12 per acre.

(c) Unmerchantable size trees suitable for sawmill or pulpwood

purposes and ranging from 3 inches to 5 inches d.b.h.; these are insured up to a maximum of $18 per acre.

(d) Seedlings or planted trees; these are insured for a specified amount per acre up to a maximum based upon age of trees as indicated in the following tabulation. (No seedling coverage is provided unless natural stands are included in the schedule of insurance.)

Age of trees	Maximum liability per acre
0 to 1 yr.	$10.00
1 to 2 yrs.	11.00
2 to 3 yrs.	12.00
3 to 4 yrs.	13.00
4 to 5 yrs.	14.00
5 to 6 yrs.	15.00
6 to 7 yrs.	16.00
7 to 8 yrs.	17.00
8 to 9 yrs.	18.00
9 to 10 yrs.	19.00
10 to 11 yrs.	20.00
11 to 12 yrs.	21.00
12 to 13 yrs.	22.00
13 to 14 yrs.	23.00
14 to 15 yrs.	24.00

Each tract is insured separately and the applicant may insure the separate tracts for various elective amounts.

Adjustment of Losses

The Company regards 600 trees per acre as a fully stocked stand. As to unmerchantable size trees (both volunteer and planted) and seedlings the Company pays in event of loss only such proportion of the limits of liability set forth above as the number of trees killed or damagel bears to 600. The Company does not, however, count beyond 600 unmerchantable size trees in determining the loss.

In addition to any adjustment for understocked stands, an acreage deductible (per tract) applies. This deductible amounts to the greater of (a) 10 acres or (b) the basic acreage deductible applicable to the state in question. For example the basic deductible for the State of Virginia is one percent. The deductible used in adjusting a loss in that state will thus be one percent of the total acreage insured but not less than 10 acres. The basic deductible ranges from a low of one percent in Virginia and Arkansas to a high of 2.3 percent in Florida and Kentucky. In the application of the deductible, the loss on the entire area burned is first determined; a deduction is then made reflecting the average amount payable per acre for either 10 acres or the average called for by the basic deductible, whichever is the greater.

The policy provides that all losses be adjusted by registered or graduate foresters at the Company's expense.

Cost of Insurance

Rates are based upon the amount of coverage per acre selected, ranging from $5 to $100 per acre (subject to the maximum limit for unmerchantable timber and seedlings). The rate for coverage of $16 per acre for example, is 10 cents per acre, that for $36 per acre is 12 cents per acre and that for $100 per acre is 18.4 cents per acre. Policyholders desiring to use a basic acreage deductible higher than that applicable to their state may do so with corresponding reduction in rates. For example the $36 per acre coverage which cost 12 cents per acre at the basic dedectible, drops to 10.31 cents with one percent additional deductible, to 9.61 cents per acre with a 2 percent additional deductible, to 8.41 cents per acre for a 3 percent additional deductible and to 7.21 cents per acre for a 4 percent additional deductible. The rate for planted seedlings is in all cases 300 percent of the base rates.

Other Conditions of Insurance

In making application for insurance, the forest owner identifies the property by location and number of acres, specifying the deductible desired and the limit of coverage per acre. The policy does not cover fire fighting or suppression expenses, stump or debris removable, nor loss or damage directly or indirectly the result of prescribed burning. In case of loss the company reserves the option to replant unmerchantable size trees or seedlings less than two years old with others of like kind and quality.

For further information concerning this program see the "Forest insurance manual and rate chart" obtainable from the Gulf American Fire and Casualty Company, P. O. Box 219, Montgomery 1, Alabama.

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Points of View

Choice of Words

In the field of public relations, information and education the choice of words is tremendously important in so far as they engender mental images that tend to orient and shape people's attitudes. A surgeon does not make a "cut"; instead he makes an "incision." A dentist fills "cavities" not "holes." In the field of social work "guidance and counselling" is given in lieu of "advice."

It is my opinion that the time has come for foresters, both in public agencies and in private industry, to take a second look at their use of the words "cut" or "cutting" when applying them to timber harvest. Surely little empathy is needed on our part to realize that the word "cut" connotes timber harvest practices that have been in the past, and unfortunately are sometimes at the present time, closely associated with destructive logging activities.

It is unfortunate indeed that today's foresters have to live with the scars and burdens of yesterday. But must we always bring these to the fore by poorly chosen words? Timber is considered a crop, and although the rotation is apt to be 150 years longer than the farmer's wheat crop, there is no reason why we should not "harvest" it just like the farmer does.

To many people there is something quite unpleasantly finite about "cutting" a timber stand; however as soon as this same stand is "harvested" they have visions of little seedlings coming up all over.

An annual allowable "harvest" may be a mere euphemism, but if older and very revered professions have indulged in the latter, surely we foresters, who are still fighting an uphill battle for professional acceptance, should not be above doing the same thing.

ERNEST E. A. WEINBERG
Seiad Valley, Calif.

Comments on "Timber Marking: Professional Procedure or Subprofessional Job?"[1]

Kermit Remele's recent item on timber marking raised some interesting questions. It may or may not be a romantic assumption that timber marking is "the embodiment of forestry." As I recall, C. A. Schenck made a similar statement years ago.

We cannot decide on who should mark timber until we provide and agree upon objectives. If we could decide upon objectives, the question might even answer itself.

Among the variables to consider are (1) the values of timber harvested and of the stand after cutting, and (2) the complexity of the marking job.

I suggest that in timber marking it is more important to stratify the forest by value and complexity classes than to stratify timber markers by education. As values and complexity increase, more competence in marking is needed.

Remele cited the selective system in the northern hardwood type as an example of the need for highly competent marking, if I understood him correctly. Marking in this type would be difficult given a particular mix of species, high average value, a lot of variation among individual trees, and a management objective to reach or approach a stocking-structure goal in short order. Certainly, this is not always the case.

For the question of how to mark a hardwood stand to reduce basal area from 120 square feet per acre to 70 (this may not be desirable in one cut), Remele may wish to select a plot of about 120 square feet of basal area per acre. He could mark it carefully to approach his goal at 70 square feet, and log it. The plot would provide an "image" for marking a larger block of timber, perhaps a little fuzzy, but an image. Frequent checks with a relascope or prism while marking are helpful, too.

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[1]Remele, Kermit E. Timber marking: professional procedure or subprofessional job? Jour. Forestry 59:134-136. 1961.

Livestock and Multiple Use

I wish to reply to Messrs. Cook and Stoddart in partial defense of Messrs. Medvick and Robert and their views on woodland grazing. Apparently Cook and Stoddart are unfamiliar with the magnitude of the grazing problem in the hardwoods of the Central States and in the southern Lake States area. Much of the forest land in this region is being destroyed by livestock grazing. The woodlands are in small ownerships, mainly farm ownership, and entirely too much is pastured. These pastured woodlands are characterized by an overstory of sawtimber and an almost complete lack of pole timber and reproduction. When a woodland is harvested that is the end of the woodland, as usually only scattered trees remain consisting of culls and inferior species. Hollow butt logs are common due to fungus infections from grazing damage. Growth is slow from soil compaction and the dry site resulting from loss of mulch and litter and the greater air velocity resulting from loss of the understory.

There is a difference between the planned and controlled grazing of livestock over vast areas in the West and pasturing of livestock in the Central States. In pasturing in the Central States a heavy concentration of livestock is confined to a small area and that area is usually overgrazed to the detriment of tree growth. There are millions of acres of permanent pasture in the Central States in need of pasture renovation. Im-

provement of this pasture land would result in many times the forage now available and we could still retain the bulk of our hardwood forests.

All is not roses either in the West in regard to forest grazing. There are severe problems of overgrazed range and some problems of forest damage by livestock. The West could also benefit by range improvement and better control of grazing on some forested areas.

Pine and other conifers suffer the same damage as the hardwoods under pasture conditions. Many conifer plantings made by the CCC, and at first protected, have been all but destroyed by livestock. Again it is the problem of a heavy concentration of stock confined on a relatively small area; pasturing as compared with range grazing.

Multiple use on vast areas of the West must include range grazing. However, forestry articles in popular magazines and government literature referring to forest grazing cause many hardwood foresters considerable grief. In southern Wisconsin and the Central States landowners exposed to this cannot distinguish between pasture and open range and persist in the belief that running livestock in their woods is a good practice. Very often the first step in the management of the Central States woodland is the exclusion of livestock. I for one refuse to mark a pastured timber tract for cutting, as a selective marking can accomplish none of the planned objectives under pasture conditions.

The subject of forestry is so broad that we cannot automatically include livestock as desirable in multiple use for there are many situations and areas where livestock must not be a part of forestry. We need a broader understanding of where livestock are a desired part of multiple use and where they are not.

PAUL OLSON
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Comments on "Comparative Development of Seeded and Planted Shortleaf Pine on a Forest Site in the Missouri Ozarks"[1]

In the December 1960 issue of the JOURNAL, Messrs. Phares and Liming compare the stocking and growth of one-year-old shortleaf pine seedlings established by direct seeding with the stocking and growth of planted 1-0 seedlings. The comparison is unique since both the seeded and planted seedlings were one year old when the comparison began. However, it is this very point which prompts me to comment on the article.

Under the conditions of the study, survival and growth were better for seedlings developed from direct seedings than for planted seedlings of the same age. The authors then conclude: "Since seeded pine outgrow planted pine under all degrees of hardwood competition, they have a slight advantage over planted pine in overcoming any competition that may develop." This implies that direct seeding would be preferred over planting in areas with vigorous hardwood competition.

The conclusion is valid for the conditions under which the comparison was made; however, I do not think the comparison was very realistic. If planting were chosen as a means of converting cutover hardwood land to pine, it seems unlikely that planting would be delayed a year as was done in this comparison. A more appropriate comparison, which is the choice the forester has, would be between seedlings from direct seeding and planted 1-0 nursery-grown seedlings, planted in the same year.

In 1956, working with loblolly pine, I compared the growth of planted 1-0 seedlings with natural seedlings germinated in place.[2] There was no difference in the growth rate between the two, but after three growing seasons the planted seedlings still maintained their initial half-foot height advantage. This suggests that had the authors made a similar comparison the planted seedlings may have been as tall or taller than the seeded seedlings, thus having an equal or better opportunity to overcome the hardwood competition.

I would like to make one comment concerning the comparative stocking of the seeded and planted spots. In general the greatest seedling mortality occurs during the first growing season after seeding or planting. The authors initiated the stocking comparison at the end of the first growing season for the seeded spots, but at the beginning of the first growing season for the planted spots; thus the percent stocking reported for the planted seedlings reflects the heavy first year mortality. This penalizes the position of the planted seedlings in the stocking comparison.

In the final analysis the choice between direct seeding and planting must be based on economic considerations and not silvicultural values alone. While the authors have presented interesting data, the question whether seeded or planted seedlings will be better able to overtop competing hardwoods has not been resolved.

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[1] Phares, Robert E., and Franklin G. Liming. Comparative development of seeded and planted shortleaf pine on a forest site in the Missouri Ozarks. Jour. Forestry 58: 957-959. 1960.

[2] Haney, G. P. The effect of hardwood control and seedbed preparation on the regeneration of loblolly pine (*Pinus taeda*, L.) Unpublished thesis. North Carolina State College, School of Forestry. 1956.

Book Reviews

American Forestry: Six Decades of Growth

Edited by Henry Clepper and Arthur B. Meyer. x+319 pp. Society of American Foresters, Washington 6, D. C. 1960. $5.

Twice in the last ten years the Society of American Foresters has called upon a select group of its members to appraise the history of forestry in the United States and to report on progress in all the various areas of forestry activity. The first of these summary histories was *Fifty Years of Forestry in the U.S.A.* which was issued in 1950 to commemorate the golden anniversary of the Society. Last November, at age sixty, the Society repeated the historiographic venture and published *American Forestry: Six Decades of Growth.*

Both of these books follow the same general organization of subject matter. Their pattern, moreover, is winning acceptance in other commemorative works. While there are merits in their multiple-authored approach to history, there are also some obvious limitations, and this reviewer is hopeful that the pattern is not becoming so established as to discourage the use of single-authored works in celebration of decennial anniversaries. The profession needs to cultivate the talents of its members who write history well. They are not numerous but those who are able in the art can research and write history in form and style which will produce books of lasting value.

American Forestry: Six Decades of Growth draws upon the experience of twenty-eight men including editors Henry Clepper and Arthur B. Meyer. Only John F. Shanklin repeats as an author who had a part in writing the earlier anniversary book. This allows reappraisal by another generation which, while it continues to face problems encountered by the founding fathers of their profession, is influenced also by many new problems and conditions born of our rapidly changing times.

It is of more than passing interest to note that chapters on "Education for the Profession" and "Forestry Research" have been advanced to places of early consideration (chapters two and three) whereas in 1950 they were well down the table of contents as chapters seventeen and eighteen. Two new subjects come in for discussion in the new work—"The Literature of Forestry" and "The Recreational Use of Forest Land."

To George A. Garrett the editors assigned the job of keynoting Six Decades of Growth. He has brought to the task incisiveness and an understanding of the broad currents of national history in which forestry has had to swim.

In other chapters treatment is made of the progress in silviculture, forest management, forest utilization, forest range management, forest-wildlife management, and watershed management. There are also brief summary histories of the federal government agencies which have been the pioneers.

C. Raymond Clar's chapter on State Forestry demonstrates again the high skill he has for writing history, as recently demonstrated in *California Government and Forestry.* It is to be hoped that the profession will find merit in Mr. Clar's suggestion that exploration of state forestry history may be one of the best means of determining the essence of changing American attitudes toward the exploitation and preservation of our vast wildland resources.

Paul M. Dunn and Robert S. Hyde hit the long ball, too, in defining the benchmarks of industrial forestry and in relating these to conditions and events in our national life. But here, too, the serious reader will ask for more and this may only be provided as individual companies within the forest products industries give more serious consideration to writing their history.

The book is concluded by chapters on Farm Forestry, the Society of American Foresters, Citizen and Trade Associations, and America and World Forestry. Tom Gill's concluding chapter flows with the skill of the professional writer and gives a benediction which reminds the profession of the high purpose and idealism which have historically been its hallmark. The historians will applaud Mr. Gill's insistence on footnotes, a virtue which other authors either eschewed or were less forceful in demanding of their editors.

Lack of documentation detracts from the book's value as an historical reference. This gives rise to asking for whom is this book written? Is it for the members of the Society, a memento of a milestone in their history? As such it is a superior product for which the editors deserve the thanks of their professional colleagues. There is some doubt in my mind, however, that the book will receive the wider consideration of the conservation-minded general public. There is too little of the color of forestry history woven into the book, too scant portrayal of the giants who made that history, too little of the conflicts which have from time to time disturbed the profession but which have also helped to mold it and the various movements which it has championed. The book of forestry history which will do that job has yet to be written. This might be a worthy objective for the Society.

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My Wilderness: The Pacific West

By William O. Douglas. 206 pp. Illus. Doubleday & Company, Inc., New York. 1960. $4.95.

Anyone familiar with previously published works of Justice Douglas will have a good idea of what to expect in this book. As an outstanding exponent of the wilderness concept, his ideas are clearly and interestingly expressed. His viewpoints are those of one who has "been there," not once but many times, and they are largely supported by an understanding of biological principles involved. His opinions are clearly and unequivocally stated, and while there may be disagreement in some instances, one cannot fail to respect their forthrightness. Many readers of the JOURNAL, for instance, will certainly take issue with certain opinions expressed with respect to the motives and actions of the U. S. Forest Service in connection with the recently established Glacier Peak Wilderness Area. Yet one will also find much evidence that the author is no stranger to the fundamentals of good forestry techniques and practices.

The areas described are the Brooks Range of northern Alaska; the Pacific Beach and rain forest of Olympic National Park, as well as Mount Adams, Goat Rocks, Goose Prairie and Glacier Peak in national forests of the Cascades—all in Washington; Hart Mountain and the Wallowas of Oregon; the Middle Fork of the Salmon River in Idaho; and the High Sierra country of California. Readers familiar with any of these regions will admire the manner in which Justice Douglas has captured not only the beauties and interests of these sections of the West but also their spirit. His enviable powers of description enable him to portray graphically the true qualities of the wilderness scene; it is obvious that he "sees," not merely "looks at things."

Conversely, those who have not or cannot visit the areas described will also find these pages of great interest. Undoubtedly, many such readers will be encouraged toward similar recreational efforts; at least, the book will develop greater appreciation of the values embodied in our wilderness lands.

The striking black-and-white illustrations by Francis Lee Jacques enhance the interest of this book. However, most foresters will notice that the sketch on page 169, depicting a branch of true fir, shows the cones hanging down rather than standing upright.

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Pulp and Paper, Chemistry and Chemical Technology (2nd ed.) Vol. II: Papermaking

By James P. Casey. xxiii + 668 pp. + 147 pp. index. Illus. Interscience Publishers, Inc., New York and London. 1960. $25.

The second volume "Papermaking" in the new three-volume edition of Casey's book maintains the high standard of the first volume. The 668 pages of text and figures cover adequately the fundamental operations of this important industry.

There are 11 chapters in the second volume, namely: Fiber Preparation, Nature of Fiber Bonding, Sheet Formation, Water Usage and Disposal, Microbiology, Beater and Wet-end Additives, Filling and Loading, Internal Sizing, Surface Sizing, Wet Strength, and Coloring.

The types of beaters and refiners, effect of beating, factors affecting beating, and pulp testing are discussed in the chapter on fiber preparation. Closely related is the chapter on the nature of fiber bonding in which are considered the importance, theories, measurement, and factors affecting fiber bonding. "Sheet formation" refers to the act of forming the wet fibers into paper. In the longest chapter (109 pages) are discussed the cleaning of stock, fiber flocculation, formation on the paper machine wire, transfer at the couch roll, wet pressing, drying of paper, calendering and supercalendering.

Water is one of the most important raw materials for papermaking and most paper mills require high-quality water. The conservationist should find special interest in the chapter on water usage and disposal including fresh water and its treatment, treatment and re-use of "white water," waste water treatment and disposal.

Within recent years microbiology has become an immensely important subject to the paper chemist, primarily because of the troubles microorganisms cause if they are not kept under control. Types of microorganisms, their effect on pulp systems, factors affecting their growth, and their control are covered in Chapter X. In the chapter on beater and wet-end additives the importance of beater addition, the use of starch, vegetable gum, and synthetic hydrophilics as wet-end additives, and the use of latices and resin emulsions as beater additives are reviewed. Then follows a discussion on the commercial use of fillers, the effects of filling, and the retention of fillers.

The chapters on internal and surface sizing are concerned with the resistance of paper to the penetration of liquids. The properties that affect sizing, methods of measuring sizing, internal sizing with rosin and other substances, pitch trouble, effect of surface sizing on the properties of paper, factors affecting surface sizing, surface sizing with starch, animal glue, other film-forming materials, and wax emulsions receive attention. Under wet strength is included a description and measurement of wet strength, use of synthetic resins and other materials, permanence of wet strength bond, utilization of "broke," and identification of wet strength resins in paper.

In the concluding chapter the coloring of paper is discussed under the main headings of properties of dyestuffs, beater or stock dyeing with acid, basic, and direct dyestuffs, stock coloring with pigments, factors affecting stock dyeing, and color matching.

The writing of such a book is a tremendous task for one man. In the reviewer's opinion the author has achieved his goal "to present

the technical side of papermaking from a fundamental viewpoint." This will be a useful and valuable book to the person interested in the manufacture of paper whether he is a student, technical worker, or specialist. The book is well printed and bound. It contains an adequate index.

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There Stand the Giants

By Harriet E. Weaver. 70 pp. Illus. Lane Book Company, Menlo Park, Calif. 1960. $2.95.

"In 1853, five loggers worked 22 days to fell it [a redwood]. Then the wind blew it down when they were away at dinner!" This is one of the amusing anecdotes that Miss Weaver uses in her book *There Stand the Giants* to brighten her story of the redwoods for children in the 8-12 age group. The book is interesting to foresters as an example of children's literature covering their field and to parents as an example of the enriching subject matter available in children's books today.

As an introduction to trees or as supplemental informative reading this book is purposeful. The child's curiosity is more likely to be aroused and sustained by this story, colored with anecdotes and interesting details of a specific tree, than a story about trees in general. While stressing the redwoods' unusual characteristics many points are also presented which are applicable to other trees. Such things as tree physiology, methods of regeneration, past and present logging practices, and efforts to preserve prime examples of the redwood are discussed simply and clearly.

John Muir referred to these trees as "emblems of permanence." This quality becomes evident as Miss Weaver tells about the history and age of the redwoods. While one tree stands, centuries have passed. And under the shade of this tree Indians, forty-niners, camels, loggers, and tourists have passed. The age of redwoods is well illustrated by a picture graph which marks one tree's growth by events in history starting with the siege of Troy when the tree is five years old.

The story is enhanced by black and white, and colored photographs in addition to drawings and picture graphs. One graph concerning the physiology of a tree is misleading. The text, however, describes the physiology correctly, and this is a minor point in a book well done.

Miss Weaver, for twenty summers a park ranger and naturalist in California Redwood Parks, writes with enthusiasm sharing her interest in these trees with the reader. When he has read the section about parks he will want to see them in person. Her use of descriptive phrases such as "washed with fog," "rhododendrons splash the forest" lifts this book out of the category of dull text. She has written a book that a child will remember.

SHARLENE P. NELSON
Lyman Springs, Calif.

The Balance of Nature

By Lorus J. and Margery Milne. viii+329 pp. +vii pp. index. Illus. Alfred A. Knopf, New York. 1960. $5.

Here is an interesting, often intriguing book that sets forth, sometimes briefly and sometimes at satisfactorily greater length, the stories of a great variety of ecological changes, some natural but mostly those that have been man-induced. Much of the book has to do with the ramifications of many different food chains and what happens to "Nature's Web" when one segment of the predator-prey relationship is upset. There is much that will interest the forester and the range manager. In the Shortgrass — Bison — Indian complex of our own West, "few primitive people have fitted so well into the pattern of nature surrounding them," yet look what happened with the introduction of the horse, the rifle, cattle, sheep, and white men!

In recent time, even the greatest of natural catastrophies has scarcely equalled the disruptions caused by the incursions of European man into other lands, and his blundering attempts to remedy one ecological error with another and usually greater one. Man's urge has always been to eliminate the competitors for his own food supply and for that of his domestic animals. When successful, the side results are often worse than the trouble itself—as in the cases of the cougar, the wolf, and the coyote. There is also the urge to turn any under-exploited resource into quick cash, regardless of ultimate consequences. Much of this makes pretty grim reading, leads one to wonder if we are all traveling down the trail laid out for us by the Arab and his goats and if, by stream pollution and similar ecological misdeeds, we may yet render our world unfit for our children to live in. Chapter 17 "The Greatest Threat to Life on Earth" relates the story of the indiscriminate use of biocides, and could profitably be read by many a top-echelon administrator.

But I have the feeling that the Milnes have overemphasized the debit side of this ledger. After all, "white man's culture" is doing right well in Western Europe and North America—as well as the Chinese culture has been doing in the valley of the Yellow River for the past five thousand years. "Tree Country" covers a vast field, from our own West Coast to South America and Africa; from Douglas-fir to thorn scrub. The statement that, except for the United States and Canada, "the only other substantial softwood forests are in northern Europe and the U.S.S.R." certainly will not set well with the foresters of Middle Europe or South Africa.

"A Yardstick for Deer" recounts the population explosion of this g e n t l e, soft-eyed creature which is well on its way to eating up our hardwood reproduction, doing for us in the wild what the domestic goat has done for the Middle East.

On what would appeal to us foresters as the brighter side is the chapter on "Conquering Rabbits,"

an excellent account of the incredible damage done to forest and grassland by this widely-introduced pest and the spectacular collapse that has followed the introduction of the virus, *Myxoma*.

As a tree farmer, I'd really like to believe that "eventual yields of twenty-five dollars per acre per year from wood products" (presumably not Christmas trees) could be expected from tree farms. As a long-time worker in the field of timber marketing, I want to be shown!

Unhappily, the text is full of quick and too-easy summaries with which I disagree. ". . . In 1954, . . . drought turned eastern New York state into a miniature dust bowl. Right in the middle of the parched countryside Bear Mountain State Park remained green because of water conserved by more than twenty beaver colonies." Admittedly, 1954 was a dry year in New York but not *that* dry and the beaver, no matter what their activities along the streams, would have had no appreciable effect upon the rocky and precipitous oak ridges of the Ramapo hills.

The Milnes have chosen to perpetuate that nature lover's myth that "an unwritten law of the outdoors has protected porcupines," even while discussing the effectiveness of reduction by poison. Concerning quill-pig control, they point out that the fisher is the only effective predator and that one state has adopted the strategy of biological control. "In Wisconsin a more imaginative approach was tried in 1958. From remote regions where fisher are still at large, a breeding stock was brought in to start biological warfare against porcupines. . . . New York and other states with large timber areas or farm lands and orchards menaced by porcupines are watching these experiments closely." Now, the "remote region" from which the breeding stock of fisher was obtained was the Adirondacks of New York, whose fisher population is big enough to stand a current harvest of more than four hundred pelts without sign of depletion, as well as to provide breeding stock for Wisconsin. You bet we York Staters are watching the experiment!

The illustrations, by Olaus J. Murie, are black-and-white pen drawings, many rather on the black side. They fit the book very well for it, too, is in sharp blacks and whites. The text is pleasingly, gently written and the book will appeal to anyone with an interest in the history of ecological changes.

DAVID B. COOK
Conservation Department, Albany, N. Y.

Windows in the Woods

By Heinz Sielmann. 139 pp. Illus. Harper & Brothers, New York. 1959. $4.95.

This is a fascinating story of woodpeckers, written by Heinz Sielmann of his work in Westphalia not far from Dulmen. It was translated from the German by Sidney Lightman.

Armed with photographic and recording equipment and approval, not too easily obtained from the forester, Sielmann and his team set forth to study the carpenters of the forest. Three native woodpeckers were to be studied, the green woodpecker, the great spotted, and the black. A mixed forest of birch, oak, larch, and pine was chosen for the study site.

By cutting windows into the backs of woodpecker tree nests, it was possible to acclimate the birds to infrared light. This permitted photographing the birds in all stages of their life cycle. Out-of-nest observations were also meticulously recorded.

I was hopeful of finding some relationship established between woodpecker populations and forest insects. None was to be found, but with an average of 34 feedings of each 7 hours per woodpecker family recorded by Sielmann there was undoubtedly a desirable impact on the local beetles and borers.

I have always thought that all woodpecker drumming was for the purpose of excavating bugs. This is not always the case. Sielmann declares that drumming is the most significant of woodpecker's actities. It is an invitation to a female of the species to join him in boring a nesting hole and a declaration to rival males that he has his territory staked out. Both of these are in addition to feeding.

The use by woodpeckers of prepared "anvils" as a tool for cracking acorns and small hazel nuts was but one of the many habits described by Sielmann. The ornithologist cannot say he really knows woodpeckers without studying this book. Wildlife photographers would certainly find inspiration in the book to attempt similar studies in America.

Sielmann writes in fascinating style which apparently does not lose in translation to English. Examples of his photographic ability are found in the 64 excellent photographs, 4 of which are in full color. For the forester or anyone with ornithological interests, *Windows in the Woods* is well worth while.

HOWARD A. MILLER
Forest Service, U. S. Dept. Agric., Atlanta, Ga.

Publications of Interest

A Bibliography of Strip-Mine Reclamation 1953-1960 prepared by Kenneth L. Bowden is available in limited supply from Secretary, Department of Conservation, School of Natural Resources, University of Michigan, Ann Arbor.

* * *

Under date of January 1961, the Outdoor Recreation Resources Review Commission has issued an 85-page *Progress Report*. The report describes the current studies and activities of the Commission on which it will base findings and recommendations to be included in its final report.

Current Literature

Compiled by LOIS MCALLISTER, *Assistant Librarian, State University College of Forestry at Syracuse University*
Range Management Section Compiled by NELLIE G. LARSON, *Library, U. S. Department of Agriculture*

General

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Retailing and Wholesaling of Christmas Trees within Selected Areas, North Central Region. By G. H. Mitchell and J. G. Kendrick. 28 pp. Illus. Ohio Agric. Expt. Sta., Wooster. 1961. Research Bul. No. 872. (North Central Regional Pub. No. 111.)

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The Forest Resources of Rural Householders in Dent County, Missouri. By A. B. Cole and R. C. Smith. 28 pp. Illus. Missouri Agric. Expt. Sta., Columbia. 1960. Res. Bul. No. 740.

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Western Forest Industry and Economic Outlook. By J. A. Guthrie and G. R. Armstrong. 352 pp. Illus. Johns Hopkins Press, Baltimore 18, Md. 1961. $6.50.

Forest Influences

A Study of Early Gully-Control Structures in the Colorado Front Range. By B. H. Heede. 42 pp. Illus. Rocky Mountain Forest and Range Expt. Sta., Fort Collins, Colo. 1960. Sta. Paper No. 55.

Forest Management

Commercial Thinning of Douglas-Fir in the Pacific Northwest. By N. P. Worthington and G. R. Staebler. 124 pp. Illus. U. S. Department of Agriculture, Washington 25, D. C. 1961. Tech. Bul. No. 1230. 40 cents (Govt. Print. Off.)

Empirical Yield Tables. By D. M. Fligg. Unp. Map, tables. British Columbia Forest Serv., Victoria, B. C. 1960. Forest Surveys and Inventory Div. Forest Survey Note No. 6.

Forest Products

Celluloseacetate: 385th Article on Macromolecular Compounds. By H. Staudinger and T. Eicher. 27 pp. Illus. Columbia Cellulose Co., Ltd., Prince Rupert, British Columbia, Canada. 1960. Translation No. 11.

Hardboard from Ohio. By S. L. Schwartz. 9 pp. Illus. U. S. Forest Products Lab., Madison 5, Wis. 1960. Report No. 2205.

Logging and Milling

Comparison of Taper Sawing and Through-and-Through Sawing. 4 pp. Diagrams. Forest Products Laboratories of Canada, Ottawa. 1960. Pub. No. 0-184.

Grading Hardwood Logs for Factory Lumber. By W. W. Calvert. 27 pp. Illus. Forest Products Laboratories of Canada, Ottawa. 1960. F.P.L. Tech. Note No. 18.

La Scie à Billon; son Emploi dans la Transformation des Bois Canadiens. By W. W. Calvert. 43 pp. Illus. Forest Products Laboratories of Canada, Ottawa. 1960. Mémoire Technique No. 10F.

Protection

Forest Insect Surveys within Specified Areas. By R. D. Shenefelt and P. A. Jones. 28 pp. Tables. Wisconsin Conservation Dept., Madison 1. 1960. Tech. Bul. No. 21.

The Nantucket Pine Moth; A Literature Review. By H. O. Yates III. 19 pp. Illus. Southeastern Forest Expt. Sta., Asheville, N. C. 1960. Sta. Paper No. 115.

Observations on Pine Susceptibility to Weevils. By R. Z. Callaham. 12 pp. Tables. Pacific Southwest Forest and Range Expt. Sta., Berkeley, Calif. 1960. Tech. Paper No. 51.

Protect Your Pines from Bark Beetles. By H. E. Ostmark and C. L. Massey. 19 pp. Illus. Rocky Mountain Forest and Range Expt. Sta., Fort Collins, Colo. 1960. Sta. Paper No. 52.

Range Management

How Good is Ozark Forage? By J. H. Ehrenreich, R. F. Buttery, and C. W. Gehrke. 8 pp. Illus. Missouri Agric. Expt. Sta., Columbia. Oct. 1960. Bul. No. B-759.

Increasing Forage on Ozark Wooded Range. By J. H. Ehrenreich and R. F. Buttery. 10 pp. Illus. Central States Forest Expt. Sta., Columbus, Ohio. Dec. 1960. Tech. Paper No. 177.

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Range Cattle Industry; Ranching on the Great Plains from 1865 to 1925. 2d Ed. By E. E. Dale. 207 pp. Illus. Maps. Univ. of Oklahoma Press, Norman. 1960. $4.

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Utilization of Five-Stamen Tamarisk by Cattle. By H. L. Gary. 4 pp. Rocky Mountain Forest & Range Expt. Sta., Fort Collins, Colo. Aug. 1960. Res. Note No. 51.

Woodward Sand Bluestem: Origin, Description, and Adaptation. By J. R. Harlan and W. R. Kneebone. 10 pp. Illus. Oklahoma Agric. Expt. Sta., Stillwater. Aug. 1960. Bul. No. B-561.

Silviculture

Afforestation of Upland Heaths. By J. W. L. Zehetmayr. 145 pp. Illus. Her Majesty's Stationery Off., Edinburgh, Scotland. 1960. Great Britain Forestry Commission Bul. No. 32. 17s. 6d.

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Prescribed Burning for Understory Control. By Thomas Lotti, R. A. Klawitter, and W. P. LeGrande. 19 pp. Illus. Southeastern Forest Expt. Sta., Asheville, N. C. 1960. Sta. Paper No. 116.

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Research at the Redwood Experiment Forest in Cooperation with the Simpson Redwood Company. By K. N. Boe. 12 pp. Illus. Pacific Southwest Forest and Range Expt. Sta., Berkeley, Calif. 1960.

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Society Affairs

Officers and Council
1960-1961

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Fourth Call for Council Nominations

All members are hereby notified that the regular biennial election will be held December 2, 1961. A president, vice president, and nine other members of the Council will be elected for the two-year term 1962-1963.

The present Council is listed in the box above. Any or all of these incumbents may be renominated, provided they accept the nomination in writing.

Membership on the Council is restricted by the Constitution to Members (formerly Senior Members) and Fellows. Any Member or Fellow is eligible to hold office who is in good standing and who accepts the nomination in writing and declares his willingness to serve if elected.

Each voter will have an opportunity to ballot on all candidates for office. Council members are elected in accordance with the system of proportional representation. The procedure of proportional representation will be explained in a later issue of the JOURNAL. It is the system by which the Society has been electing Council members for more than two decades.

Candidates for the office of president are voted on separately; the candidate who receives the highest vote is declared elected president, and the candidate who receives the next highest vote is declared elected vice president. Thus all candidates for president are considered as nominated also for vice president.

How Nominations Are Made

The Constitution (Article VIII, Section 2) states the conditions under which nominations are made by petition.

1. Each petition shall name but one candidate.

2. All candidates must be eligible to hold elective office.

3. A petition shall bear the signatures of at least ten voting members who at the time of signing the petition are eligible to vote in the coming election. (Eligible voting members are Junior Members, Members, and Fellows in good standing.)

4. A voting member may not sign more than one nominating petition for president or more than one nominating petition for a member of the Council. That is, he may sign two, but no more.

5. Petitions must be in the Society office by September 16, 1961.

The Society has no special form for submitting nominating petitions. They may be written as follows:

We, the undersigned voting members of the Society of American Foresters, hereby nominate John Doe, a Member (or Fellow) for the office of president (or member of the Council) for the two-year term 1962-1963.

The form of acceptance of a nomination may read as folows:

I accept the nomination to the office of President (or to membership on the Council) of the Society of American Foresters for the two-year term 1962-1963, and agree to serve if elected.

No nomination will be considered valid unless supported by the nominee's acceptance in writing which should be attached to the nominating petition.

All nominating petitions should be sent promptly to the Society office, 425 Mills Building, 17th Street at Pennsylvania Avenue, N. W., Washington 6, D. C. The executive secretary will gladly provide information about nominating or election procedure.

According to the Constitution (Article VIII, Section 1) a Nominating Committee has been appointed by President Connaughton.

This committee is charged with the following duties:

1. To set the date of the election.

(December 2, 1961, is the date.)

2. To provide for at least two candidates for the office of president, and at least nine candidates for membership on the Council.

3. To receive separate nominating petitions for the office of president and for each member of the Council, and to supplement such petitions when necessary with other nominations in order to comply with item 2 above.

The Nominating Committee will make no nominations of its own unless the voting membership fails to make the required minimum number of nominations by petition. Voting members should accordingly get busy and make their own nominations. For their information the distribution of Council members by states during the period 1946-1961 is shown in Table 1, page 143, February issue.

Nominations Received

On the date of going to press the following nominations had been received:

For President

B. E. Allen, Savannah, Ga. (Council Member 1956-1957, 1958-1959, 1960-1961.)

Paul M. Dunn, New York, N. Y. (Council Member 1946-1947, 1948-1949.)

J. Herbert Stone, Portland, Ore. (Council Member 1954-1955, 1956-1957, 1958-1959.)

For the Council

William C. Bramble, Lafayette, Ind. (Council Member 1960-1961.)

Donald E. Clark, Denver, Colo. (Council Member 1960-1961.)

George W. Dean, Charlottesville, Va.

F. T. Frederickson, International Falls, Minn.

W. D. Hagenstein, Portland, Ore. (Council Member 1958-1959, 1960-1961.)

Svend O. Heiberg, Syracuse, N. Y. (Council Member 1960-1961.)

George M. Jemison, Washington, D. C.

William A. Parr, Bel Air, Md.

Archie E. Patterson, Athens, Ga.

Burnett H. Payne, San Francisco, Calif.

Richard J. Preston, Jr., Raleigh, N.C. (Council Member 1960-1961.)

John F. Shanklin, Washington, D C.

Eugene V. Zumwalt, Washington, D. C.

SETH G. HOBART, *Chairman*
Nominating Committee

Fourth Call for Fellow Nominations

All members (formerly Senior Members) and Fellows of the Society are hereby advised that nominations for the grade of Fellow are now open. The election of Fellows will be held at the time of the Society's regular biennial election, December 2, 1961.

As defined by the Constitution (Article III, Section 7), "Fellows shall be foresters recognized generally throughout the profession as persons who have rendered outstanding service to forestry and to the Society. They shall be elected from the Members."

Nominations by Petition

The procedure for placing Members in nomination for the grade of Fellow is by petition. The Society has no printed form for this purpose; the petition may be typewritten thus:

We, the undersigned Members and Fellows of the Society of American Foresters hereby nominate John Doe for election to the grade of Fellow in 1961.

Remember these simple rules:

1. A petition may not name more than one nominee.

2. It must be signed by not less than 25 Members or Fellows in good standing.

3. It must be accompanied by a factual, not eulogistic, biographical sketch of at least 300 words giving an account of the nominee's professional career and accomplishments.

4. It must be received in the executive office of the Society, 425 Mills Building, 17th Street at Pennsylvania Avenue, N.W., Washington 6, D. C., not later than September 16, 1961.

The executive employees of the Society cannot be responsible for obtaining signatures on partially completed petitions or on petitions incomplete by reason of unacceptable signatures (that is, signatures of other than Members and Fellows in good standing). Only those nominees' names will appear on the ballot whose petitions are complete and valid in all details as of September 16, the closing date.

Election Procedure

Fellows are not elected by the membership at large, but by a board of electors which consists of all present Fellows, the Council, the chairmen of the 22 Sections, and the chairmen of the 10 subject Divisions.

The system is described in Article IV, Section 4 of the Constitution. To win election a nominee must receive an affirmative vote of not less than one-half the total number of votes cast, as provided in Bylaw 11.

For the 1961 election there will be 135 electors, of whom 94 are Fellows. An elector has one vote only. Thus, a Fellow who is also a Council member has but one vote.

Significance of the Grade

The highest membership distinction that can be conferred by the Society, this grade is awarded in recognition of outstanding service to forestry and to the Society. Fellows do not pay increased dues; their dues are the same as those of Members.

Since the Society was founded in 1900, there have been 125 Fellows elected. At the present time the number of living Fellows is 94.

The current roster of Fellow is shown below.

Nominations Received

On the date of going to press the following nominations for Fellow had been received:

Frank A. Albert, Jacksonville, Fla.

Robert S. Campbell, New Orleans, La.

Walter H. Horning, Washington, D. C.

George M. Jemison, Washington, D. C.

Ira J. Mason, Bethesda, Md.

William M. Oettmeier, Fargo, Ga.

A. B. Recknagel, Ithaca, N. Y.

John F. Shanklin, Washington, D. C.

Allen E. Thompson, Seattle, Wash.

George O. White, Jefferson City, Mo.

List of Fellows

The current roster of Fellows follows. The state in which each Fellow is domiciled and the year of his election are shown after his name.

Allen, Shirley W. California. 1948.
Allison, John H. Minnesota. 1959.

Bailey, Reed W. Utah. 1955.
Baker, Frederick S. California. 1949.
Boyce, John S. Connecticut. 1955.
Brundage, Frederick H. Oregon. 1949.

Carter, E. E. District of Columbia. 1942.
Chapman, Herman H. Connecticut. 1922.
Clapp, E. H. District of Columbia. 1930.
Clepper, Henry. Virginia. 1949.
Coffman, John D. California. 1946.
Connaughton, C. A. California. 1959.
Coulter, C. Huxley. Florida. 1957.
Cowan, Charles S. Washington. 1957.
Cox, William T. Minnesota. 1953.

Damtoft, W. J. North Carolina. 1951.
Dana, Samuel T. Michigan. 1935.

Demeritt, Dwight B. Maine. 1955.
Demmon, E. L. North Carolina. 1951.
Detwiler, Samuel B. Virginia. 1955.
Drake, George L. Washington. 1953.
Dubuar, James F. New York. 1957.
Duffield, J. W. Washington. 1959.
Dunn, Paul M. New York. 1959.

Eldredge, Inman F. Florida. 1942.
Evans, Charles F. Georgia. 1949.
Evenden, J. C. Idaho. 1953.
Eyre, F. H. Virginia. 1959.

Ferguson, J. A. Pennsylvania. 1949.
Fischer, Arthur F. California. 1940.
Fontanna, Stanley G. Michigan. 1955.
Frank, Bernard. Colorado. 1957.
Fritz, Emanuel. California. 1951.
Frothingham, E. H. California. 1942.

Garratt, George A. Connecticut. 1953.
Garrison, Paul M. Louisiana. 1957.
Gill, Tom. District of Columbia. 1948.
Granger, C. M. Maryland. 1946.
Guise, Cedric H. New York. 1951.
Guthrie, John D. Virginia. 1942.

Hall, J. Alfred. Oregon. 1955.
Harper, V. L. District of Columbia. 1959.
Hartley, Carl P. Pennsylvania. 1949.
Hawes, Austin F. Connecticut. 1939.
Hawley, Ralph C. Arizona. 1942.
Heacox, Edwin F. Washington. 1957.
Heiberg, Svend O. New York. 1957.
Heintzleman, B. Frank. Alaska. 1951.
Hosmer, Ralph S. New York. 1932.
Hunt, George M. Wisconsin. 1951.

Illick, Joseph S. New York. 1946.
Isaac, Leo A. Oregon. 1953.

Jeffers, Dwight S. Oregon. 1948.

Kaufert, Frank H. Minnesota. 1955.
Keen, Frederick P. California. 1955.
Kelley, E. W. California. 1949.
Kellogg, Royal S. Florida. 1949.
Kinney, Jay P. New York. 1942.
Kircher, Joseph C. Florida. 1957.
Kittredge, Joseph. California. 1953.
Korstian, C. F. North Carolina. 1942.
Krueger, Myron. California. 1951.

Lowdermilk, Walter C. California. 1955.
Lutz, Harold J. Connecticut. 1957.

Marckworth, G. D. Washington. 1955.
Marsh, R. E. District of Columbia. 1948.
Martin, Clyde S. Washington. 1948.
Mason, David T. Oregon. 1948.
McArdle, R. E. District of Columbia. 1953.
Merrill, Perry H. Vermont. 1957.
Metcalf, Woodbridge. California. 1953.
Meyer, W. H. Connecticut. 1959.
Munger, Thornton T. Oregon. 1946.
Munns, Edward N. California. 1949.

Nelson, DeWitt. California. 1957.

Orell, B. L. Washington. 1959.

Porter, Earl. Alabama. 1957.
Preston, J. F. District of Columbia. 1948.
Price, Jay H. Arizona. 1951.

Reynolds, R. R. Arkansas. 1957.

Sampson, A. W. California. 1959.
Schmitz, Henry Washington. 1940.
Schumacher, F. X. North Carolina. 1959.
Shirley, Hardy L. New York. 1951.
Show, S. B. California. 1948.
Siecke, E. O. Texas. 1946.
Sparhawk, W. N. New Hampshire. 1946.

Vaux, H. J. California. 1959.

Wahlenberg, W. G. North Carolina. 1957.
Wakeley, Philip C. Louisiana. 1957.
Watts, Lyle F. Oregon. 1946.
Wilm, H. G. New York. 1959.
Wirt, George H. Pennsylvania. 1948.

Ziegler, E. A. Pennsylvania. 1949.

Council's Column

Conservation Leadership and the SAF Members

Each quarter of a century or so, Americans have shown increased interest in their natural resources. The tide of conservation has ebbed and flowed; but gradually it has caught the interest of many. At present the flow is strong; public sentiment is headed for another high tide. True conservationists—professionals and nonprofessionals alike—are concerned; they are anxious to secure and hold the advances this floodtide makes possible. They see a growing need for ever more active leadership on all levels and in all fields of resource management.

The country has been asked to make the maximum individual and joint effort. If we are to supply our crucial share of leadership, then we must work to keep our leadership and professional ability above the floodtide. The person who believes he is dedicated to the cause of conservation and to the welfare of his countrymen misleads himself unless he is active in more than the job he is paid for. The layman who decries a lack of active leadership should cause some restless, soul-searching moments for the paid conservationist who limits his own efforts. When professional leadership and advice are easily available, they are used.

That laymen and nonprofessionals seek leadership is evident. The bulging memberships of conservation organizations of limited scope but unlimited emotional appeal is one form of evidence. So is the large percentage of associate memberships in professional organizations. There is food for thought in the fact that the membership of one strictly regional conservation group with limited objectives and with a mere handful of chapters is greater than the total membership of the Society of American Foresters. We find more food for thought in the membership of some of our own Sections where many of those enrolled are nonprofessional. There is still more grist in the fact that a 1958 survey showed that less than a third of the eligible professionals in one Section's territory were Society members.

The public service activities of some Sections testify to the need for and acceptance of conservation leadership. The Inland Empire Section organized a Natural Resources Youth Camp at Lake Chatcolet in 1958. Key people from various federal, state, and private institutions were brought in as instructors for the week-long camp. The boys were selected from Inland Empire counties on the basis of demonstrated interest in conservation work. In addition to organizing and sponsoring the camp, the Section made five $25 scholarships available to outstanding boys. So successful has the camp been that it became a tri-agency project last year. The Pacific Northwest Division of the American Society of Range Management and the Soil Conservation Society's Inland Empire Section have joined with the SAF Inland Empire Section in this very worthy effort to strengthen the cause of conservation.

Another type of conservation education effort was sponsored by the North Idaho Chapter. Interested groups were invited to take part in a panel on proposed changes in the boundaries of the two-state Selway-Bitterroot Primitive Area. Members of the Wilderness Society, the Idaho Department of Fish and Game, and others were taken through the area in order that they might have firsthand information.

This year the Forest Practices Committee of the Missoula, Montana, Chapter is intensifying its examination and evaluation of cutting practices on land of all categories of ownership. The committee, composed of representatives from private, state, and federal agencies, expects that its work will lead to recommendations for general cutting practices.

Earlier, the Northern Rocky Mountain Section gained favorable legislative reaction to proposals for strengthening Montana's forestry program.

These examples help point up the type of leadership needed and accepted from members of the Society; but there are many other areas of leadership responsibility.

The concept of conservation grew out of forestry. Hence, there remains an obligation to the broad field of general conservation and to its many specialties. In a time of emotionalism and growing pressure, there is need for the accepted conservation technician to keep a steady hand on the wheel. The forester can look at some of the newer fields in conservation work to see the compounding of problems which result from lack of public acceptance of professionals in those fields. While the forester may experi-

ence similar difficulties in his own sphere, yet he has an aura of general acceptance, experience, and seniority that mark him for natural leadership.

To be effective in any of the roles of leadership and community service, the forester must be up-to-date and active. The outlet for leadership is through professional organizations and many other groups with active interests in land management programs. But it is through professional competence that a person maintains his role of leadership in either type of organization. And it is through professional competence that contributions are made to the profession and to the nation, to family and self. The individual who moves ahead merely by being bumped by outside change fails to meet these obligations. Whatever else a conservationist may do, he falls short of the nation's needs unless he is a student and a teacher —and hence a leader. There is little chance of professional satisfaction for the isolated idealist, the content, or the inactive.

Because some conservation technicians are inactive, the present leadership bears an additional burden —that of recruitment and encouragement. These activities are mandatory in the job of augmenting and perpetuating the pool of leadership inherent in the Society. Thus, the member of the Society of American Foresters faces challenges in four phases of leadership: leadership for other foresters, leadership for conservation technicians in other fields, leadership for laymen-conservationists, and conservation leadership for communities, states, and the nation. It is only through the effort of presently active and experienced conservation workers that gains can be consolidated and that public attention can be attracted to constructive channels.

CHAS. L. TEBBE

Travel Grant Applications Invited to IUFRO Conference

The Society of American Foresters has received a grant of $10,000 from the National Science Foundation to assist qualified American scientists to travel to Vienna, Austria, to attend the 13th meeting of the International Union of Forest Research Organizations, September 9 to 22.

IUFRO has an international congress about every five years. Its program, organized in 11 sections, deals with research projects of common interest to many nations. Technical papers are invited on topics chosen for the agenda of each section, and others may be contributed. About fifty member nations are expected to send 200 to 250 research scientists to the meeting in Vienna this year.

American scientists who plan to go to Vienna, who have interests in forestry research, and who need financial assistance for travel may apply to the Society of American Foresters, 425 Mills Building, 17th Street and Pennsylvania Avenue N.W., Washington 6, D. C.

Each applicant is requested to supply the following information:

1. A short professional biographical sketch, including present affiliation and research activities.

2. Purpose of attending IUFRO meeting and specific participation in the program, if any.

3. Estimate of amount of travel assistance needed.

Travel grants will be limited to round-trip airplane fare from the grantee's home to Vienna, Austria, and return, or some fraction thereof. Applications must be received by June 10, 1961 to be considered. They will be reviewed by a special committee under the chairmanship of Dr. V. L. Harper, chairman of the Society's Committee on International Relations.

Young Rainer Appointed SAF Business Manager

Young W. Rainer of Falls Church, Va., has been appointed business manager of the Society of American Foresters, Washington, D. C., effective June 1.

A native of Alabama and a 1949 forestry graduate of Auburn University, Mr. Rainer is 35 years of age. He joined the Alabama Division of forestry in 1949, resigning as district forester in 1954 to become area forester for the Southern Pulpwood Conservation Association at Greensboro, N. C.

YOUNG RAINER

In 1958 he became a forester on the staff of American Forest Products Industries, Inc., in Washington, D. C., which organization he leaves to join the Society.

Mr. Rainer takes over the duties of Miss L. A. Warren who has been with the Society since 1928 and who will retire later this year. As administrative assistant in the executive office, he will undertake such other duties and responsibilities as may be assigned by the Council, including those of assistant treasurer. He has been a member of the Society since 1951.

Thanks For Your Opinion

In the February issue of the JOURNAL we published a "We Present" article entitled "Thomas N. Busch and the Buschmaster." In the same issue the editor solicited comments on the article as an example of *one type* of article we thought would have general professional interest, and therefore might meet with the approval of the many foresters who have expressed the opinion that the JOURNAL should carry more material of "general interest." The development, by a forester, of this rather amazing piece of special forestry machinery seemed a fit subject.

As this issue of the JOURNAL went to press we have received a total of 28 written comments. Of this total, six individuals voiced disapproval of the article; 22 approved.

All of the comments of disapproval were involved in some way with the subject of advertising. Four interpreted the article and the accompanying cover photo as being free advertising for the company that has undertaken to manufacture Mr. Busch's development. Two were fearful that such an interpretation might be reached by others. In addition, one of the writers noted that while the development of an item of forest machinery was a legitimate subject, it should be described more analytically. He went on to say, "The enthusiastic biography of Thomas Busch which comprises the second part of the article is not at all objectionable. By itself, this would be a pleasant account of how a man has applied his energies, talents, and insights to the solution of some difficult equipment problems in the woods." One critic asked, "How much advertising revenue accrued to the SAF for the advertising *story* (italics mine) on the Buschmaster?"

On the plus side, some comments:

"I welcome this type of article as a practical contribution to the profession. I'd hate to think we are so lofty we cannot discuss the tools of the trade."

"Very good. Very informative and interesting. Recommend you continue articles of this type in the future."

". . . an excellent item, interesting and informative, detailed and complete, even to the touchy business of price."

"I would like to be counted on the side of those who are highly in favor of more articles in the Journal of general professional interest."

"I have had some very favorable comments from our student members too."

NEW OFFICERS of the Central Rocky Mountain Section of the Society of American Foresters, installed during Colorado State University Foresters' Days on February 25, discuss plans for 1961-1962. *L* to *R* are Chairman H. C. Eriksson, assistant regional forester for the U. S. Forest Service in Denver; Vice Chairman Elmer W. Shaw, research editor for the Rocky Mountain Forest and Range Experiment Station at Fort Collins; and Secretary-Treasurer Charles J. Newlon, district forester for the Colorado State Forest Service at Fort Collins.

"Good equipment is necessary to accomplish our profession's objectives. More articles on good equipment innovations should be greatly appreciated. You stated that the membership wanted more articles of *general* professional interest. I hope that you don't get too general. Many foresters consider the Journal as a supplement to their basic education."

For all opinions expressed, our thanks.

ARTHUR B. MEYER
Editor

A MANUAL OF COMMON BEETLES OF EASTERN NORTH AMERICA

Elizabeth S. Dillon and Lawrence S. Dillon
Agricultural and Mechanical College of Texas

A comprehensive, liberally illustrated identification manual for professional entomologists, agronomists, foresters, scientific collectors, students of entomology, amateur collectors, and casual naturalists. Included are nearly 1,200 species of beetles in the 64 most common families. Illustrations include 1,160 species in black and white, 17 species in full color, 37 line drawings of larvae, and 544 text figures. Complete keys are provided for ready identification of specimens. *896 pp. $9.25**

NITROGEN METABOLISM IN PLANTS

George C. Webster, The Ohio State University. A fairly comprehensive and uniform coverage of the chemical pathways of nitrogen metabolism in plants. Chemical and physical interpretations are emphasized. Recent discoveries are placed in their proper perspective. *160 pp. $3.50**

RESPIRATORY METABOLISM IN PLANTS

Harry Beevers, Purdue University. Biochemical reactions and sequences important in plant respiration. The book examines the roles of individual enzymes as well. Other processes are related: salt uptake, nitrogen metabolism, fat metabolism, photosynthesis and growth. *Ready in May. About 256 pp. $3.85**

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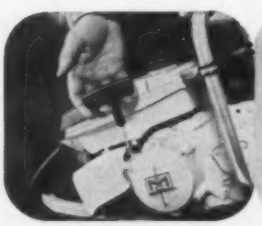

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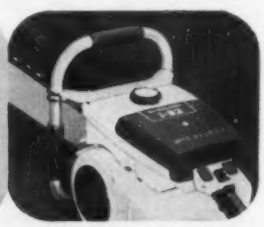

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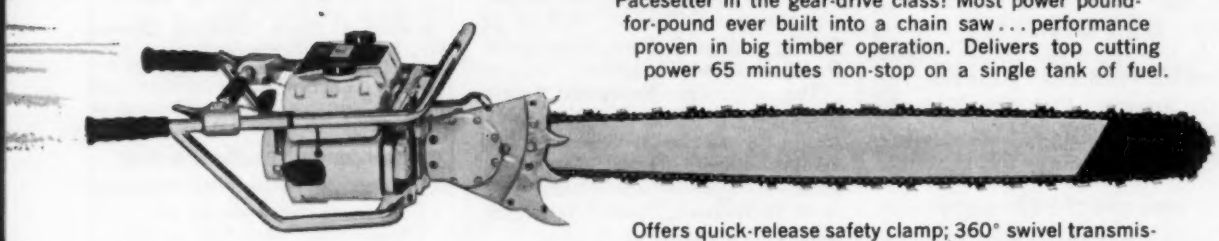
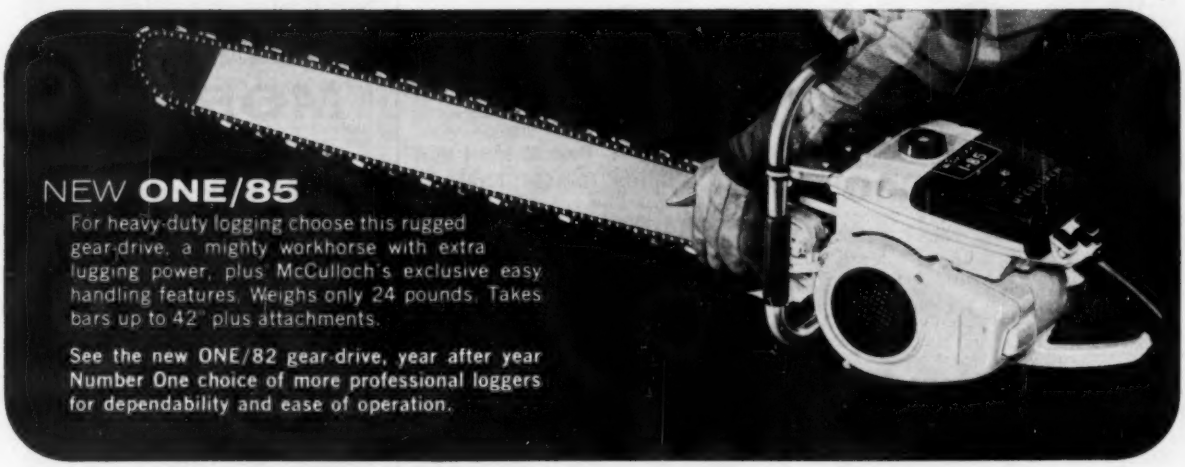


Offers quick-release safety clamp; 360° swivel transmission; built-in felling sights; throttle-control handlebars set in rubber mounts. Weighs only 34 pounds with transmission. Takes Bars up to 60".



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5-0404

Insecticide-Wildlife Relationships
Further Information on the Investigation

The JOURNAL OF FORESTRY, in the August 1960 issue, page 644, reported on the controversial situation that had developed regarding pest control and wildlife loss problems in the United States. A brief history was given of the various incidents leading up to the appointment of a Committee on Pest Control and Wildlife Relationships in the National Academy of Sciences-National Research Council.

This Committee has been organized and has worked out matters of general policy, guiding principles and over-all objectives. Subcommittees have been established to assemble, study and evaluate information available on the many and diverse ramifications of the problem. Reports have been outlined in some detail along the following lines:

1. Evaluation of Pesticide Wildlife Loss Problems.

2. Research: Past, Now Underway and Future Needs.

3. Guiding Principles for Pest Control.

As yet these studies have not reached the stage when general conclusions can be agreed upon. As soon as the reports have reached the review stage it is planned to discuss them at a meeting of liaison representatives. This will likely be in late May or early June.

As one of the ways by which objective No. 5 "To provide a forum for the discussion of problems of pest control and wildlife relationships" may be accomplished, the Committee has accepted responsibility for organizing and conducting two symposia.

The one on Pest Control and Wildlife Relationships was presented before the Annual Meeting of the National Research Council, Division of Biology and Agriculture, Washington, D. C., on March 10, 1961.

The other on Ecological Consequences of the Use of Toxic Chemicals in Pest Control is to be presented before the Tenth Pacific Science Congress, Section of Agricultural Sciences, in Honolulu, Hawaii, in August 1961.

A copy of the committee objectives statement and lists of committee and subcommittee members follow:

National Academy of Sciences
National Research Council

DIVISION OF BIOLOGY AND AGRICULTURE

Committee on Pest Control and Wildlife Relationships

Statement of Objectives

1. To provide technical advice and guidance to government agencies, industries, and other public and private organizations and individuals on problems involved in the maximum control of pests with a minimum of damage to other forms of plant and animal life.

2. To provide critical evaluation of information concerning the effects (direct and indirect) of various pest control operations on plant and animals, particularly fish and wildlife.

3. To stimulate and encourage research and investigations to obtain factual information as a basis for sound guiding principles and policy determinations.

4. To foster cooperation among various agencies, organizations, industries, and individuals concerned with pest control operations and the effects on plant and animal life.

5. To provide a forum for the discussion of problems of pest control and wildlife relationships.

Committee on Pest Control and Wildlife Relationships

I. L. Baldwin, *Chairman*, Office of the President, University of Wisconsin, Madison 6, Wis.

George C. Decker, Economic Entomology Section, State Natural History Survey, 163 Natural Resources Building, Urbana, Ill.

Ira N. Gabrielson, Wildlife Management Institute, Wire Building, Washington 5, D. C.

Tom Gill, Charles Lathrop Pack Forestry Foundation, 1500 Massachusetts Avenue, N.W., Washington 5, D. C.

George L. McNew, Boyce Thompson Institute for Plant Research, Yonkers 3, N. Y.

E. C. Young, Graduate School, Purdue University, Lafayette, Ind.

Mitchell R. Zavon, Kettering Laboratory, Eden and Bethesda Avenues, Cincinnati 19, Ohio.

W. H. Larrimer, *Executive Secretary*, National Research Council, Washington 25, D. C.

Subcommittee Membership List

EVALUATION OF PESTICIDE WILDLIFE PROBLEMS

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George C. Decker, *Chairman*, Economic Entomology Section, State Natural History Survey, 163 Natural Resources Building, Urbana, Ill.

Edward L. Kozicky, Conservation Department, Olin Mathieson Chemical Company, East Alton, Ill.

Daniel L. Leedy, U. S. Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

George L. McNew, Boyce Thompson Institute for Plant Research, Yonkers 3, N. Y.

L. D. Newsom, Entomological Research, Agricultural Experiment Station, Louisiana State University, Baton Rouge 3, La.

H. P. Nicholson, Pesticide Pollution Studies, Division of Water Supply & Pollution Control, Department of Health, Education & Welfare, Public Health Service, 50 Seventh Street, N. W., Atlanta 23, Ga.

Robert L. Vannote, American Mosquito Control Association, P. O. Box E, Morris Plains, N. J.

Mitchell R. Zavon, Kettering Laboratory, Eden and Bethesda Avenues, Cincinnati 19, Ohio.

RESEARCH NEEDS

Ira N. Gabrielson, *Chairman*, Wildlife Management Institute, Wire Building, Washington 5, D. C.

James A. Beal, Division of Forest Insect Research, Forest Service, U. S. Department of Agriculture, Washington 25, D. C.

Clarence Cottam, Welder Wildlife Foundation, P. O. Box 1396, Sinton, Tex.

Samuel A. Graham, University of Michigan, School of Natural Resources, Ann Arbor, Mich.

C. H. Hoffman, Entomological Research Division, U. S. Department of Agriculture, Beltsville, Md.

Donald A. Spencer, U. S. Department of the Interior Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Wildlife Research Center, Building 45, Federal Center, Denver 7, Colo.

Clarence M. Trazwell, Taft Sanitary Engineering Center, U. S. Public Health, 4676 Columbia Parkway, Cincinnati 26, Ohio.

John A. Zapp, Jr., Haskell Laboratory, E. I. duPont de Nemours and Company, Wilmington 98, Del.

GUIDING PRINCIPLES FOR PEST CONTROL ACTION PROGRAMS

Tom Gill, *Chairman*, Charles Lathrop Pack Forestry Foundation, 1500 Massachusetts Avenue, N.W., Washington 5, D. C.

E. D. Burgess, Plant Pest Control Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C.

C. C. Compton, Shell Chemical Company, Suite 1103, 1700 K Street, N.W., Washington 6, D. C.

W. W. Dykstra, U. S. Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

R. L. Furniss, Division of Forest Insect Research, Pacific Northwest Forest & Range Experiment Station, P. O. Box 4059, Portland 8, Ore.

R. D. Hale, Conservation Foundation, 30 East 40th Street, New York 16, N. Y.

E. L. Kolbe, Western Pine Association, 510 Yeon Building, Portland 4, Ore.

S. W. Simmons, Communicable Disease Center, Atlanta 22, Ga.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatement received in the Society office during the month of March are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of May 31, 1961.

Communications from the voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Alaska Section

Junior Grade

Claussen, M. D., Forester, Bur. of Land Mgmt., Fairbanks, Alaska. Univ. Idaho, BSF, 1958.

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Allegheny Section

Student Grade

PENNSYLVANIA STATE UNIVERSITY

Kelly, H. E. Little, N. G.
Laubach, R. F. Mellinger, W. J.
Oplinger, A. J.

WEST VIRGINIA UNIVERSITY

Chipman, D. W. Weaver, J. E.

Junior Grade

Heary, E. J., General Mgr., Nittany Timberlands, Inc., State College, Pa. Pa. State, BSF, 1959.

Love, J. A., Forester, Northeast Forestry Service, Inc., Hawley, Pa., Pa. State, BSF, 1959.

Member Grade

Wallace, R. G., Ass't. Forester, Pa. Dept. of Forests & Waters, Ligonier, Pa. Pa. State, BSF, 1956 (Junior 1956).

Appalachian Section

Student Grade

DUKE UNIVERSITY

Pruess, J. F. Quarles, D. L.

Junior Grade

Drake, R. B., Paul & E. B. Sanders Farm & Forest Products, Ritter, S. S. (Reinstatement).

Guinness, W. M., Forestry Ass't., Catawba Tbr. Co., Catawba, S. C. Univ. Mich., BSF, 1959.

Member Grade

Chappelle, D. E., Research Forester, Southeastern Forest Expt. Sta., Charlotteville, Va. Colo. State, BSF, 1956, Duke Univ., MF, 1959 (Junior 1956).

Affiliate Grade

Lawrence, W. B., Project Forester, S. C. State Comm. of Forestry, Newberry, S. C.

Central Rocky Mountain Section

Sutdent Grade

COLORADO STATE UNIVERSITY

Butruille, J. F. Pulford, W. J.

Junior Grade

Gibson, H. P., Dist. Ranger, USFS, Spearfish, S. D., Mich. State, BSF, 1950.

Heist, E. G., Forester, USFS, Cody, Wyo. Colo. State, BSF, 1959.

McGrath, W. P., Forester, Homestake Mining Co., Spearfish, S. D. Univ. Mich., BSF, 1946.

Member Grade

Weidenhaft, G. E., Staff Officer, USFS, Delta, Colo. (Reinstatement).

Affiliate Grade

Hathaway, C. C., Forest Ranger, USFS, Deadwood, S. D.

Central States Section

Junior Grade

Paulu, G. F., Chief, Chicago Aerial Survey, Franklin Park, Ill. Univ. Mich., BSF, 1959.

Columbia River Section

Student Grade

OREGON STATE COLLEGE

Barstad, R. L. McDermott, J. E.
Gordon, L. R. Spangenberg, N. E.

Junior Grade

Grover, V. L., Appraiser, Bur. of Land Mgmt., Medford, Ore. Univ. Maine, BSF, 1953.

Member Grade

Baker, R. J., Forester, State Board of Forestry, Eugene, Ore. (Junior 1953).

Bergman, M. H., Forester, Willamette Valley Lumber Co., Salem, Ore. (Junior 1954).

Best, J. H., Forester, Williamette Nat'l. Forest, Blue River, Ore. Mich State, BSF, 1956, Ore. State, MF, 1958 (Junior 1956).

Ching, K. K., Research Forester, Ore. Forest Research Center, Corvallis, Ore. (Junior 1954).

Cruickshank, E. D., Forester, State Board of Forestry, Springfield, Ore. (Junior 1954).

Ellson, A. C., Dist. Ranger, USFS, Corvallis, Ore. (Junior 1954).

Faught, T. L., Forester, Pope & Talbot Lbr. Co., Westfir, Ore. (Junior 1954).

Gartman, J. L., Forester, Elk Lbr. Co., Medford, Ore. (Junior 1954).

Gartz, J. F., Tbr. Ass't., State Tax Comm., Salem, Ore. (48R55).

Hawley, G. S., Tbr. Sales Ass't., State Dept. Natural Resources, Kelso, Wash. (Junior 1953).

Jones, E. E., Forester, USFS, Eugene, Ore. (Junior 1954).

Kline, R. F., Forester, Kline Contractors, Inc., Medford, Ore. (Junior 1954).

Larson, R. O., Eng., USFS, Eugene, Ore. (Junior 1954).

Martin, J. L., Forester, USFS, Pendleton, Ore., Mich. State, BSF, 1954 (Junior 1956).

McCallum, W. B., Forester, U. S. Plywood Corp., Eugene, Ore. (Junior 1953).

McFarland, H. J., Forester, Rosboro Lbr. Co., Finn Rock, Ore. (51R54).

Metzger, R. E. Forester, Bur. of Land Mgmt., Eugene, Ore., State Univ. N. Y., BSF, 1956 (Junior 1956).

Morrison, L. D., Forester, Bur. of Land Mgmt., Medford, Ore., Ore. State, BSF, 1957 (Junior 1957).

Owen, W. D., Ass't. County Eng., Josephine County, Grants Pass, Ore. (Junior 1954).

Rodgers, J. G., Forester, Ga. Pacific Corp., Toledo, Ore. (Junior 1952).

Sorsdahl, D. H., Forester, Bur. of Land Mgmt., Salem, Ore. (53R55).

Stolaas, H. L., Dist. Administrator, State Dept. Natural Resources, Longview, Wash. (Junior 1954).

Thede, R. W., Forester, Bur. of Land Mgmt., Salem, Ore. (49R55).

Wommack, D. E., Grad. Student, Ore. State College, Corvallis, Ore. (Junior 1953).

Gulf States Section

Student Grade

LOUISIANA STATE UNIVERSITY

Forbes, D. C.

Junior Grade

Colwick, J. B., Forester, International Paper Co., Mansfield, La. La. Poly. Institute, BSF, 1952.

Member Grade

Wright, J. P., Consultant-Forest Eng., Houston, Texas (49R54).

Inland Empire Section

Student Grade

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Hodge, R. S. — Stancer, W. H.
McDonald, S. E. — Vosen, H. C.
Woolwine, P. C.

Junior Grade

Johnson, F. R., Forester, Long Lake Lbr. Co., Spokane, Wash. Mich. College Mining & Tech., BSF, 1952.
Shimp, R. H., Forester, Boise Cascade Corp., Winchester, Idaho. Mich. State, MS, 1942.

Intermountain Section

Junior Grade

Maw, E. C., Forest Supv., USFS, Pocatello, Idaho. Utah State, BSF, 1942.

Kentucky-Tennessee Section

Junior Grade

Foster, J. C., Service Forester, Ky. Division of Forestry, Elizabethtown, Ky. Univ. Ga., BSF, 1960.

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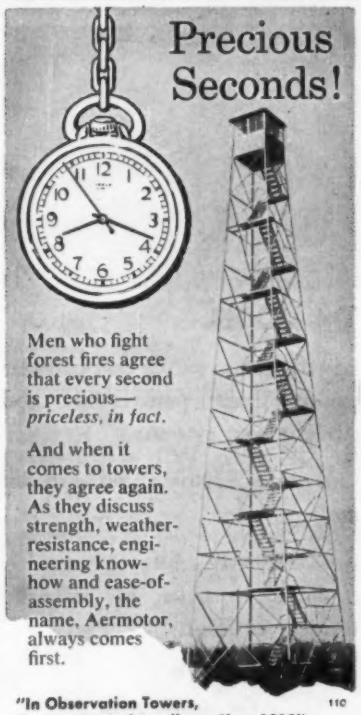
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New England Section

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Cronin, J. V. — Goldie, M. S.
Melander, E. N.

Junior Grade

Durgin, J. J., Forester, Bingham, Maine. Univ. Maine, BSF, 1961.
Ripley, H. S., Resident Forester, New England Forestry Foundation, Groton, Mass. Univ. Maine, BSF, 1948.

Affiliate Grade

Libby, W. L., Co-owner, Libby's Camps, Vanceboro, Maine.
Slater, H. R., Chief Forester, Eastern Pulp Wood Co., Calais, Maine.

New York Section

Student Grade

STATE UNIVERSITY OF NEW YORK
Gunther, R. W. H. — Kriehbaum, W.

Member Grade

Hampson, R. J., Forester, Nat'l. Lead Co., Tahawus, N. Y. Univ. Maine, BSF, 1953, State Univ. of N. Y., MS, 1958 (Junior 1957).

Affiliate Grade

White, R. R., Supt., Howard Smith Paper Mills Ltd., Malone, N. Y.

Northern California Section

Student Grade

UNIVERSITY OF CALIFORNIA
Cloyed, L. A. — Rickson, D. E.

Junior Grade

Brown, C. W., Forester, USFS, Eureka, Calif. Univ. Maine, BSF, 1950.
Sadie, A. E., Tbr. Sales Officer, USFS, Gasquet, Calif. W. Va. Univ., BSF, 1959.

Member Grade

Davis, F. R., Biology Teacher, Miramonte High School, Orinda, Calif. (Junior 1954).
DeBano, E. A., Ass't. Specialist, Univ. of Calif., Berkeley, Calif. (Junior 1954).
Elliott, J. E., Ass't. Forest Supv., USFS, Redding, Calif. (Reinstatement).
Kulosa, E., Forester, Setzer Box Co., Elk Creek, Calif. (Junior 1954).
Nelson, T. W., Woods Foreman, Diamond Nat'l. Corp., Paynes Creek, Calif. (Junior 1954).
Nilson, A. E., Consulting Forester, Western Tbr. Services, Arcata, Calif. (Junior 1954).
Pywell, R. E., Tbr. Mgmt., USFS, Concord, Calif. (Junior 1954).
Toland, J. R. S., Ass't. Dist. Ranger, USFS, Challenge, Calif. (51R55).
Zaerr, J. B., Grad. Student, Univ. of Calif., Berkeley, Calif. (Junior 1954).

Affiliate Grade

Seibold, R. F., Forester, USFS, Seiad Valley, Calif.

Northern Rocky Mountain Section

Junior Grade

Holgren, R. L., Forester, USFS, Fortine, Mont. Univ. Mont., BSF, 1959.

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Ozark Section

Junior Grade

Phillips, J. L., Ass't. Forester, Crossett Co., Wilmar, Ark. La. State, BSF, 1960.

Affiliate Grade

Freeman, J. C., State Farm Forester, Heavener, Okla. (Reinstatement).

Puget Sound Section

UNIVERSITY OF WASHINGTON

Ells, C. D. Ryan, R. J.

Junior Grade

Jaszkowski, R. T., 214 No. Emerson, Wenatchee, Wash. (Reinstatement).

Stratton, M. W., Dist. Administrator, Dept. of Natural Resources, Ellenburg, Wash. Univ. Idaho, BSF, 1950.

Southeastern Section

Student Grade

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Zoerb, M. H.

UNIVERSITY OF GEORGIA

King, S. A. Robinson, D. H.

Junior Grade

Herbst, W. W., Mgmt. Forester, Continental Can Co., Inc., Savannah, Ga. Pa. State, BSF, 1953.

Member Grade

Clark, P. M., USFS, Blue Ridge, Ga. (Junior 1954).

Todd, R. L., Forester, Newton, Wright & Hardin Lbr. Co., Forsyth, Ga. Mich. College Mining & Tech., BSF, 1951 (Af54J57).

Umholtz, F. A., Forester, Union Bag-Camp Paper Corp., Louisville, Ga. Pa. State, BSF, 1954 (Junior 1954).

Affiliate Grade

Carter, E. A., Forester, Ga. Kraft Co., Macon, Ga.

Stough, G. S., Forester, St. Regis Paper Co., Pensacola, Fla.

Upper Mississippi Valley Section

Student Grade

IOWA STATE UNIVERSITY

Barker, D. M. Huff, V. D.

UNIVERSITY OF MINNESOTA

Bundy, R. A. Gilbson, W. L.
Hurley, J. L.

Junior Grade

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Allen, E. E. Younkin, M. C.
Renken, D. P. Zimmer, M. J.

Washington Section

IOWA STATE UNIVERSITY

Junior Grade

Ward, R., U. S. Capitol, Washington, D. C. (Reinstatement).

Member Grade

Heaton, P. L., Project Director, USFS, Washington, D. C. (36R61).

Wisconsin-Michigan Section

Student Grade

MICHIGAN COLLEGE OF MINING & TECHNOLOGY

Nelson, R. L.

UNIVERSITY OF MICHIGAN

Hetzel, T. D. Perison, L. C.

Junior Grade

Genys, J. B., Instructor, Univ. of Wisconsin, Madison, Wis. (Affiliate 1956).

Godel, E. D., Ass't. Dist. Forester, Wis. Cons. Dept., Wausau, Wis. Univ. Minn., BSF, 1959.

Hawes, R. W., 4987 E. Main Street, Applegate, Mich. (Reinstatement).

Kodrich, M. R., Forester, Court House, Wisconsin Rapids, Wis. Purdue Univ., BSF, 1956.

VanSickle, C. C., 825 Sylvan Ave., Ann Arbor, Mich. (Reinstatement).

Member Grade

Brevitz, R. F., Head, Mich. Shade Tree Co., Battle Creek, Mich. (Junior 1954).

Burton, J. E., 308 Clinton St., Alpena, Mich. (Junior 1954).

Falasky, E. V., Route 5, Tomahawk, Wis. (Junior 1954).

Jessup, D. W., Dist. Forester, Abitibi Corp., Alpena, Mich. Mich. State, BSF, 1955 (Junior 1955).

Rhoades, H. E., Court House, Neillsville, Wis. (Junior 1954).

Schallau, C. H., Economist, Lake States Forest Expt. Sta., East Lansing, Mich. (Junior 1954).

Voice, J. D., Fife Lake, Mich. (Junior 1954).

Westell, C. E., Forest & Wildlife Ecologist, Packaging Corp. of America, Filer City, Mich. (Junior 1954).

Associate Grade

Zimmerman, F. R., Wis. Cons. Dept., Madison, Wis. (Reinstatement).

No Section

Member Grade

Schubert, T. H., U. S. Rubber Sumatra Plantations, Kisaran, Sumatra East Coast, Republic of Indonesia (Junior 1953).

Corresponding Grade

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Forestry News

Natural Resources Message

President Kennedy on February 24 sent a special message on Natural Resources to Congress. There were six main provisions in the message.

Discussing *Forests,* the President said "most projections of future timber requirements predict a doubling of current consumption within forty years. At present cutting rates, we are using up our old growth timber in Western areas." Lamenting that "the condition of our forest land area is substantially below par," he stated that "45 million acres are in need of reforestation; more than 150 million acres require thinnings and other timber stand improvement measures if growth rates are to be increased and quality timber produced. . . ."

The President then urged the Congress to accelerate forest development on federal lands both as a long-term investment and as a method of relieving unemployment in distressed areas. The Secretaries of Agriculture and the Interior have been directed to accelerate the building of access roads to federal timber in order "to make additional supplies of merchantable timber available to small businesses."

The Secretary of Agriculture has also been directed to develop a federal and state program "to help small independent timber owners and processors attain better forest management standards and more efficient production and utilization of forest crops."

In the section on *Public Lands,* the President advocated a development program of balanced usage of the public domain for grazing, forestry, recreation, wildlife, urban development and minerals.

Turning to *Recreation,* Mr. Kennedy pressed for passage of a wilderness bill; ordered the Secretaries of Agriculture and the Interior to come up with a federal recreation land program, conduct surveys to determine location of additional national parks, forests, and seashore areas, to insure acquisition of recreational lands in connection with federally-financed reservoirs, provide "adequate open spaces for recreation facilities in urban areas"; and called for a broad policy of fish and wildlife protection.

Under *Water Resources,* the President advocated planning for all major river basins, and urged legislation so future reservoir sites can be reserved far in advance. He asked for a speed-up in flood-control programs.

The message also dealt with *Electric Power,* reaffirming TVA-type projects, and with *Ocean Resources.*

Kennedy Forestry Proposals

In his special farm message sent to Congress March 17 the President in a reference to forest resources stated that forest land is "one of our most important natural resources, and one of our most neglected."

He further said that "special emphasis" should be given "to the improvement of small, privately-owned farm woodlands and other small forests." He noted that farm forestry is "an important sector of our agricultural economy in which the rate of progress and production is far from satisfactory." "Yet," he continued, "here is a crop which is not in surplus and to which many farmers should turn, for their benefit and the Nation's. If our grandchildren are to have only the same continuous supply of timber products as we now have, growth of timber on these farm woodlots and other small holdings will have to be doubled within the next forty years."

The President also recommended that the following be done "to insure adequate forest resources in the future" for privately-owned woodlands and the national forests:

"1. Rejuvenate the Forest Service's long-range program for the development and improvement of our National Forests—a program already returning substantial revenues to the Treasury and designed eventually to return $500 million a year. Accompanying measures were requested in my earlier message on Resources.

"2. Accelerate, through a larger Federal grant, the present Federal-State cooperative assistance program to farm and small forest owners for the application of scientific forestry techniques.

"3. Expand tree planting funds, in order to make productive fifty million acres that will not restock naturally within a reasonable time, and to increase the timber stand on another one hundred million acres.

"4. Increase protection against losses caused by fire, forest insects, and tree diseases. The Federal Government's share of the burden in preventing and controlling forest fires has not been met, even though the states contribute the greater share.

"5. Emphasize our incentive cost-sharing programs with owners for tree planting, timber stand improvement, and certain other practices under the Agricultural Conservation Program.

"6. Expand forestry research, too long neglected.

"7. Encourage the establishment of management and marketing forest cooperatives."

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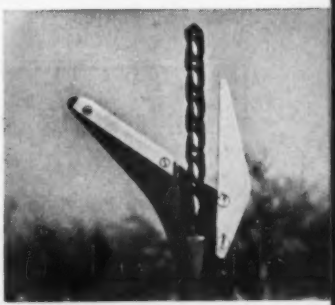

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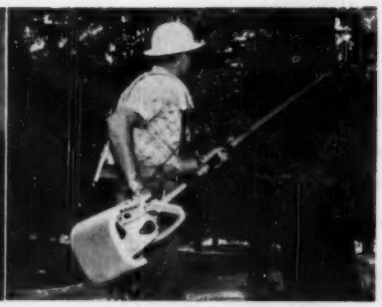

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National Wilderness Preservation System

Hearings on Senate bill 174, introduced by Senator Clinton P. Anderson (New Mexico) and 13 others were held at Washington, D. C., on February 27 and 28 before the Senate Committee on Interior and Insular Affairs. A total of 42 witnesses testified at the hearing of which 24 favored the bill and 18 opposed or suggested some amendment.

Secretary of Interior Stewart Udall, Chief Forester McArdle, and E. C. Crafts, assistant chief, U. S. Forest Service, supported the bill in the form introduced. A representative of the Federal Power Commission opposed the bill on the basis of creating more difficulty in licensing.

NASCD Farm Woodland Policy

The National Association of Soil Conservation Districts, at its annual meeting in February, adopted a new policy on farm woodland management to encourage individual districts to help promote private forestry.

Recommendations for tree planting assistance and cooperation are spelled out. The NASCD also encourages its districts to cooperate with forest industries in developing and sponsoring wood-using industries; encouraging continuous crops of timber; sponsoring Busy Acres, Keep Green, Pilot Forests, and Tree Farm programs; and encouraging understanding between woodland owners and the wood-using industries.

Highlights of the 26th North American Conference

Nearly 1,500 international authorities on renewable natural resources management, conservation administrators, biologists, foresters, outdoor writers, and sportsmen attended the 26th North American Wildlife and Natural Resources Conference that

BOYD L. RASMUSSEN

was held March 6-8, 1961, in Washington, D. C. Represented in the registered attendance were conferees from the United States, Canada, Mexico, England, Scotland, Australia, and Sweden.

The theme of this year's meeting was "Planning for Population Pressures." Participating in the two general sessions were Stewart L. Udall, Secretary of the Interior; William Vogt, national director, Planned Parenthood Federation of America; Sanford S. Farness, director-secretary, Tri-County Regional Planning Commission, Lansing, Mich.; Ira N. Gabrielson, president of the sponsoring Wildlife Management Institute; Conrad L. Wirth, director, National Park Service; and Frederick Gutheim, president, Washington Center for Mertopolitan Studies.

Six technical sessions were devoted to specific resource management problems. Dr. Clarence Cottam, director, Welder Wildlife Foundation, Sinton, Texas, closed the successful international conference with an appraisal of significant trends and probable developments in resources use.

CHARLES L. TEBBE

PUBLIC

New Regional Forester at Missoula Announced

Boyd L. Rasmussen, deputy assistant chief, U. S. Forest Service, Washington, D. C., has been named regional forester in charge of the Northern Rocky Mountain Region, with headquarters at Missoula, Mont. He replaced Charles L. Tebbe, who retired effective March 31, 1961.

Mr. Rasmussen has been a career forester in the Department of Agriculture for 25 years. As regional forester he will have responsibility for directing the multiple-use management of 16 national forests in Montana, northern Idaho, eastern Washington, and parts of the Dakotas.

A native of Glenns Ferry, Idaho, and a graduate of the Oregon State College of Forestry in 1935, Mr. Rasmussen first worked for the Forest Service at Pacific Northwest Forest Experiment Station in Portland, Ore. He served as ranger, staff officer, and as supervisor on several national for-

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ests in the Northwest.

In 1952 he was assigned to the Washington Office, Division of Fire Control, after which he was made assistant regional forester in charge of fire control in state and private forests for the Intermountain Region, with headquarters at Ogden, Utah.

Mr. Rasmussen returned to the Washington Office in April 1959 where he served on the staff of Assistant Chief Edward P. Cliff.

USFS Regional Forester Tebbe Retires

Charles L. Tebbe, regional forester for the Northern Region of the U. S. Forest Service, retired effective March 31. The retirement was granted at his request because of the continuing impact of severe illness, Mr. Tebbe said.

He had been regional forester of the Northern Region since November 1956. Before that assignment, Tebbe was from 1952 to 1956 regional forester in the Northeast Region with headquarters at Philadelphia. He had been assigned to Missoula earlier as director of the Northern Rocky Mountain Forest and Range Experiment Station.

Tebbe began his career in the Forest Service at Berkeley, Calif., with the California Forest and Range Experiment Station. He was assigned to Washington, D. C., in 1939 to do information and education work. He also had assignments in state and private forestry cooperative programs and was later appointed as the Forest Service's liaison officer with the War Production Board.

In 1943 Tebbe was promoted to assistant regional forester in charge of cooperative state and private forestry in the Pacific Northwest Region. In 1946 he was appointed director of the Northern Rocky Mountain Forest and Range Experiment Station at Missoula. He returned to Washington in 1950 to serve for two years as Defense Production Coordinator for the Forest Service.

A native of Weed, Calif., Tebbe received his B.S. degree in forestry from the University of California at Berkeley in 1929. He later worked in private industry in California and spent two years as a logging engineer for a concern in the Philippine Islands. He is a member of the Council of the Society of American Foresters. He was appointed to the Montana State Board of Forestry by Governor Aronson in 1956.

CLARENCE PROUT

Prout Appointed Head Minnesota Conservation Department

With thirty-five years of service in the Minnesota Department of Conservation, the last seven of which have been as deputy conservation commissioner, Clarence Prout has been appointed the commissioner by Governor Andersen. He assumed the acting commissioner's duties on January 4, 1961, and was appointed commissioner on March 1, becoming the ninth to hold the post since 1931 when the Department was organized, and one of three career men in that position.

Prout, a 1923 graduate of Iowa State College in forestry, started as a forest patrolman in the Minnesota Forest Service in 1925 and served in various field work capacities until 1944 when he was appointed deputy director of the Division of Forestry.

In October 1948 he was made director of the Division of Forestry, a position he held until January 1, 1954, when he was appointed deputy conservation commissioner by Chester S. Wilson, then conservation commissioner.

In addition to the varied experiences in forestry Prout has had the over-all administrative duties of the Divisions and Bureaus of the Department; wildlife in the Division of Game and Fish, state owned lands, minerals, and waters in the Division of Lands and Minerals and Division of Waters, and Minnesota's recreation and tourist industry in the Division of State Parks.

In his capacity as director of the Division of Forestry and deputy conservation commissioner he has had numerous affiliations and activities in professional, state, and national organizations, including membership in the Society of American Foresters.

Woodward Chosen Colorado Director

Harry R. Woodward, director of the South Dakota Department of Game, Fish and Parks, has been chosen as the new director of the Colorado Game and Fish Department, effective February 15. Mr. Woodward was selected on the basis of competitive examinations given by the Colorado Civil Service Commission from among eleven applicants for the

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position. He replaced Thomas L. Kimball, who resigned in September 1960 to accept the executive directorship of the National Wildlife Federation, Washington, D. C.

Mr. Woodward is a 1941 forestry graduate of Utah State University and is a member of the Society of American Foresters.

Secretary Freeman Notes Weeks Law Anniversary, Cites Benefits

Secretary of Agriculture Orville L. Freeman called attention to the 50th anniversary on March 1 of legislation that resulted in the addition of 20 million acres of public land for 48 national forests in the eastern half of the United States.

This legislation, known as the Weeks Law, led to establishing of forests extending along the Appalachian Mountains from Maine to Georgia, reaching westward to the Great Plains.

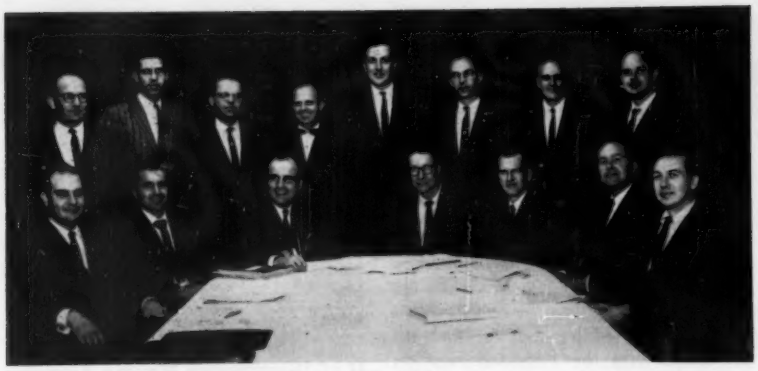
Interest in establishment of public forest reservations in the eastern states developed as early as 1880 and reached fruition on March 1, 1911, when President Taft approved an act named after the sponsor, Congressman John W. Weeks of Massachusetts. The law authorized the Secretary of Agriculture to purchase land for national forests on the headwaters of navigable streams to regulate streamflow as an aid to navigation. All purchases are approved by the National Forest Reservation Commission, made up of two congressmen, two senators, and the Secretaries of War, Interior, and Agriculture.

The Weeks Law and subsequent legislation provided for state and federal cooperation which resulted in large scale fire protection for state and privately owned forest lands. Today 48 states, including Hawaii and Alaska, participate in this cooperative program. Arizona and Kansas do not. More than 400 million acres of forest land are now intensely protected from fire, as compared to the 60 million acres protected when the Weeks Law went into effect.

Former Dust Bowl Lands Given Colorful Names

Four million acres of National Grasslands, part of the National Forest System, have been given names reminiscent of their history and legend, the U. S. Department of Agriculture recently announced.

Forest Service gave the lands—formerly known as land Utilization Projects and identified by state abbreviations and numbers—names befitting their locality.



Shown at the meeting of the Southern Forest Fertilization Task Force of the National Plant Food Institute are members (standing *L* to *R*) Drs. R. W. Starostka (Grace Chemical Co.); L. J. Metz (U. S. Forest Service); J. E. Sedberry (American Potash Institute); L. C. Walker, *chairman*, (University of Georgia); W. W. Rennie (du Pont); H. A. Stangel (Allied Chemical); D. D. Stevenson (Buckeye Cellulose Corp.); and F. W. Woods (Duke University).

Seated (*L* to *R*) are Drs. R. L. Beacher and J. M. Brown of the Institute; and guest scientists Drs. J. E. Maki (N. C. State College); C. G. Wells (U. S. Forest Service), H. A. Fowells (U. S. Forest Service), J. R. Hamilton (University of Georgia), and C. F. Brown (University of Georgia). Drs. Maki, Wells, Hamilton, and C. F. Brown reported on research financed in part by the Institute. Dr. Fowells discussed nutritional research of the Forest Service throughout the United States.

The newly named National Grasslands are: Little Missouri, Sheyenne, and Cedar River in North Dakota; Buffalo Gap, Grand River, and Ft. Pierre in South Dakota; Comanche and Pawnee in Colorado; Cimarron in Kansas; Oglala in Nebraska; Thunder Basin in Wyoming; Black Kettle and Rita Blanca in Oklahoma; Cross Timbers, Caddo, and part of Rita Blanca in Texas; Kiowa in New Mexico; Curlew in Idaho; and Crooked River in Oregon.

USDA Announces Wildlife Phase of "Operation Outdoors"

Sportsmen can look forward to better hunting and fishing in the national forests during the next 10 to 15 years because of a wildlife habitat management program recently announced by the U. S. Department of Agriculture. This plan, called "National Forest Wildlife," (and published in bulletin form) is part 2 of Operation Outdoors of the U. S. Forest Service.

The newly announced program is designed to improve fish and game conditions. Planning of improvements for each area will be carried out in cooperation with state fish and game departments.

Highlights of the program include: planting shrubs, grasses and herbaceous plants on 1.5 million acres of game range; clearing openings, food patches, and game ways for wildlife in dense vegetation on 400,000 acres; and improvement of 7,000 miles of fishing streams and 56,000 acres of lakes by stabilizing banks, planting streamside cover, and constructing channel improvements. The cost of improvements is estimated at $25.6 million over a 10 to 15-year period.

Forest Service also plans to improve hunting and fishing by more carefully coordinating wildlife management with the development of other resources.

SCS Milwaukee Forester Retires

Stanley S. Locke, forester in the Soil Conservation Service for the past quarter century, retired in March. A graduate of the University of Michigan in 1923, his first professional assignment was with the U. S. Forest Service on timber in Idaho and Washington. Returning to the Midwest in 1926 he worked with George Banzhaf and Co. and the Illinois Department of Conservation as assistant and state forester before going with SCS.

Locke has been active in Society affairs, first as Chapter chairman at Milwaukee and later as secretary and chairman of the Wisconsin-Michigan Section.

William J. Lloyd, a 1938 forestry graduate of the University of Idaho, replaces Locke at Milwaukee. He will

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act as a forestry adviser to nine SCS state conservationists in the Lake and North Central States. He will give special emphasis to soil survey interpretations for wood-crop production.

Clayton Crocker Retires

Clayton S. Crocker, chief of personnel management for the Northern Region, U. S. Forest Service, retired March 31 after more than 40 years of continuous employment with the Forest Service.

A native of Idaho, Crocker took up his duties with the Forest Service in June 1918 as packer and guard on the Selway National Forest at Kooskia, Idaho.

He served successively as district ranger, staff officer, deputy supervisor, and supervisor on the Selway, Nezperce, and Cabinet National Forests. In 1943 he was appointed chief of the Division of Fire Control. He was named chief of the Division of Personnel Management in 1950 and has served since in that position.

In 1959 Mr. Crocker received a Department of Agriculture Superior Service Award.

SCHOOLS

Oregon Logging Safety Institute Notes Grim Problem

One out of every 2¼ workmen in the woods in Oregon will be injured this year and one out of every 260 will be killed unless something is done about it, according to Oregon's first Logging Safety Institute which was sponsored in February by the Oregon State College School of Forestry and the Pacific Northwest Loggers Association.

Speakers painted a grim picture of the need for improved safety programs. They noted that 59 loggers were killed in Oregon last year, compared to 77 fatal accidents in all other industries combined. Logging and sawmilling, which employs 7.2 percent of the Oregon work force, has 47 percent of all fatal accidents.

At the same time, Institute leaders pointed the way to reducing deaths and crippling and costly injuries. Major points in "accident prevention," they emphasized, include a safety program and "safety attitude" for every operation—little and big; safety inspections; proper selection, placement, and training of employees; accident investigations and reporting; and measurement of safety performance.

U of Washington Honors Alumnus

Ralph F. Dreitzler of Seattle, retired wood products industry executive, has been named the University of Washington Foresters' Alumni Association "Honored Alumnus for 1961."

Dreitzler, who received his Bachelor of Science in forestry from the University in 1921, retired recently as assistant to the president of the Baxter-Wyckoff Co. For many years previously, he was general manager of the West Coast Wood Preserving Co.

The award presentation was the highlight of the annual College of Forestry banquet in the Student Union Building, attended by alumni, faculty, and students.

Dreitzler is the 14th forestry alumnus to receive the award. It was presented by Dr. Henry Schmitz, president emeritus of the University and a previous winner of the honor.

Arthur B. Anderson Honored

Dr. Arthur B. Anderson, chief of the Division of Forest Products Chemistry in the University of California's Forest Products Laboratory at Richmond, has been elected a Fellow of the British Institute of Wood Science.

He was honored for his outstanding contributions to the field of wood chemistry and forest products utilization.

Cornell University Offering Correspondence Course in Wildlife Field

A five-lesson correspondence course in the basic fundamentals of wildlife law enforcement and fish and game management was offered this spring by the State College of Agriculture at Cornell University, at the request of the New York State Conservation Department. It was available to the public at a total cost of $10. (Applications were not accepted after April 1).

The course, given by Professor Carl Carlozzi, "is designed for persons in-

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terested in the field of conservation, including sportsmen and outdoorsmen who want to study the history and philosophy of conservation and wildlife management."

The five lessons of the course covered the following topics: (1) general introduction, (2) history and development of wildlife, (3) history and development of wildlife management, (4) ecological principles as a basis for modern management, and (5) life history of important New York plants and animals.

St. Regis Scholarships Announced

St. Regis Paper Company announces that in recognition of the importance of scientific forestry methods it again offers two graduate fellowships in forestry in addition to five undergraduate scholarships in forestry. The fellowships are valued at $1,000 each and are given for one year.

Winners of the two St. Rigis fellowships in forestry this year are Charles H. A. Little of the University of New Brunswick School of Forestry and James H. Gottsacker of the New York State University College of Forestry at Syracuse University.

Recreation Courses Now Available in Forestry at the University of Michigan

To meet the growing demand for foresters with training in wild land recreation, a series of new courses is being offered on the Ann Arbor campus of The University of Michigan beginning this and next year by Prof. Grant W. Sharpe. The basic recreation course deals with the importance of recreation, its history, economic value, trends in use of various lands, with considerable emphasis being placed on state parks, national parks, and recreational use of national forests. This 2-hour course is titled Recreational Use of Wild Lands.

The Landscape Architecture Department is assisting by offering a 2-credit course for forest recreation students in the planning of recreation areas, emphasizing the principles involved and the standards of design. The course covers such items as the design of camp grounds and picnic areas, park signs, roads, sanitation facilities, tables, fireplaces, the use of plantings, and other pertinent subject matter.

Because interpretation is becoming an important phase of recreation, a 2-hour course in Methods of Natural History Interpretation is also being offered. This deals with museums, roadside and trailside exhibits, nature trails, signs, lecture programs, libraries and publications, and other features of typical naturalist programs.

A new course, Recreational Land Management and Administration, will cover the principles and problems of maintenance, protection, human relations, personnel planning, and similar materials.

Another new 2-credit course is a seminar for graduate students and will be concerned with current studies, problems, and controversies of major recreation areas.

The recreation program is designed to add to and supplement a forester's training in forest land management, preferably at the graduate level, and is not a park management program as such.

There are two Ph.D. and five Master candidates with undergraduate forestry degrees enrolled in recreation in the Forestry Department at the present time.

Massachusetts Short Courses

A short course in hardwood lumber grading and measurement will be held at the University of Massachusetts, Amherst, May 22-23.

During the period June 12-16 a production gluing workshop is scheduled.

ASSOCIATIONS

Maughan Re-elected President N. C. Association

William Maughan, consulting forester of Durham, was re-elected president of the N. C. Forestry Association for a second one-year term at a directors meeting at Raleigh, February 15. Also re-elected to serve another one-year term were T. G. Harris of Roanoke Rapids, first vice president; Herman M. Hermelink of Charlotte, second vice president; Wayne A. Corpening of Winston-Salem, third vice president; R. W. Graeber of Raleigh, treasurer, and Ben F. Park of Raleigh, secretary and director of public relations.

J. Walter Meyers Named to Georgia Registration Board

Appointed by Georgia Governor Ernest Vandiver for a four-year term on the state board of registration for foresters recently, was J. Walter Myers, Jr., executive director of the Forest Farmers Association with headquarters in Atlanta.

Mr. Myers is a graduate of the Louisiana State University School of Forestry, where he received his Bachelor degree in 1941 and Master in 1951. He has been executive director of the Forest Farmers Association, an organization of owners of 25,000,000 acres of timberland in 15 southern states, since 1951. In addition, he is editor of the monthly *Forest Farmer* magazine, and the annual *Forest Farmer Manual.*

The board of registration for foresters has responsibility for considering and acting on all applications for registration under the Georgia law authorizing optional licensing of professional foresters.

Boardman Named to Head Nature Conservancy

Walter S. Boardman, former school superintendent of Oceanside, N. Y., has been named executive director of the Nature Conservancy. The Nature Conservancy, dedicated to the preservation, in their natural state, of biologically or geologically significant examples of the American landscape, was organized in 1950. During its existence the organization has accomplished permanent preservation, either through acquisition or management, of 35 natural areas in 14 states totalling 7,000 acres, besides an almost equal

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amount of land in other areas which was helped by the Conservancy. Nonprofit, with headquarters in Washington, D. C., the Conservancy also has a branch office in Berkeley, Calif., and official representatives in many states with sixteen state and local chapters.

PRIVATE & INDUSTRIAL

Ward Williams Joins Editorial Staff of Pulp & Paper International

Ward C. Williams, formerly editor for American Forest Products Industries, Inc., Washington, D. C., has joined the editorial staff of *Pulp & Paper International*, a monthly overseas journal published by Miller Freeman Publications of San Francisco, and will be stationed in Zurich, Switzerland.

Before joining AFPI he was employed by Miller Freeman as associate editor of *The Lumberman*, *The Timberman*, and *Pulp & Paper* in Seattle.

Mr. Williams is a member of the Society of American Foresters and served as editor of "The District of Columbia Forester."

E. C. Steinbrenner Elected Chairman of Western Forest Soils Council

The Western Forest Soils Council held its winter meeting at Oregon State College, Corvallis, on February 27. Members elected Dr. E. C. Steinbrenner, forest soils research specialist for the Centralia Research Center of the Weyerhaeuser Company, president of the Council. Dr. S. P. Gessel was retained as secretary.

Other business involved nominating forest and soil scientists from other states as prospective members of the council to broaden its influence and work. A subcommittee has under consideration the revision of the Analytical Procedures Manual for soil testing which the council published sev-

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

Positions Available

Immediate vacancy for wildlife research biologist with Maryland Department of Research and Development. Salary, $5,040 to $6,302 (maximum in 6 years). Location, Annapolis. **Write Dr. L. Eugene Cronin, director, Box 1510, Annapolis, Md.**

Expected openings July 1 at new western Maryland research center: research forester ($6,280-$7,849, or $5,040-$6,302); wildlife research biologist ($6,280-$7,849 or $5,040-$6,302); and freshwater fish research biologist $5,040-$6,302). **Write Dr. Vagn F. Flyger, Box 1510, Annapolis, Md.**

Also opening for conservation education specialist ($5,660-$7,073), **Write Mr. Joseph S. Larson, same address.**

State agency seeks mature, well-qualified, wood technologist or utilization specialist for industry-assistance pilot program during summer. Minimum employment period of 8-10 weeks. Will serve as counsel to wood industries in product and process development, service requests for technical information and assistance, and assist in the planning and development of new wood industries. Applicants to use personal car on reimbursement basis. **Box O, Society of American Foresters, 425 Mills Building, Washington 6, D. C.**

Positions Wanted

Forester, B.S. Pa. State, 1957. Age 25, married, 1 child, veteran. Experience: U.S.F.S. in Oregon and California. Project Sales Officer (Timber), general administration, recreation, planning, watershed and wildlife management, range management plans and inventory, reforestation, and insect control. Will consider any forestry position in Northeastern U. S. **Box I, Society of American Foresters, 425 Mills Building, Washington 6, D. C.**

Forester, B.S.F., 1953, Iowa State University. Age 33, veteran, married, two children. Experience: 5 years with state forestry organization in all phases of field forestry; 3 years Deputy State Forester, administration of forestry programs. Desire position with administrative responsibility in state organization or private industry in Lake States or Rocky Mountains. **Box J, Society of American Foresters, 425 Mills Building, Washington 6, D. C.**

Forester, B.S. Forestry & Wildlife, 1960, Virginia Polytechnic Institute. Age 22, married. Experience: 9 months timber marking, cruising, forest management, Continuous Forest Inventory. Now with western state agency. Desire position with eastern public or private organization with advancement opportunity. **Box K, Society of American Foresters, 425 Mills Building, Washington 6, D. C.**

Forester, B.S. major in Forestry, University of Georgia, 1960. Age 26, married, 1 chid, veteran. Experience: 6 months ranger with Georgia State Forestry Commission. Resigning present position because of state's discontinuance of trainee program and no other openings with State Forestry Commission. Desire employment in Southeast. **Box L, Society of American Foresters, 425 Mills Building, Washington 6, D. C.**

B.S., M.C.M.T., 1960 seeks responsible position with company engaged in logging or pulpwood operations anywhere in U.S. 6 months Forest Ranger I; Age 22, married, 1 child. Available immediately. **Box M, Society of American Foresters, 425 Mills Building, Washington, D. C.**

Forester, B.S., Oregon State College, 1956. Age 28, married, 1 child. Experience: 3 years Bureau of Land Management, California & Oregon; sales layout, timber appraisal, road location, reforestation, timber trespass and right-of-way acquisition; 2 years commissioned Officer U.S. Army Engineers. Desire position in Northeast with opportunity for responsibility and advancement. **Box N, Society of American Foresters, 425 Mills Building, Washington 6, D. C.**

eral years ago. Continued requests, principally from other countries, for this out-of-print volume indicates a need for its revision and reprinting.

The Council set the week of June 26 for the summer field meeting and tour. This will be held in southwestern Oregon to review the pilot soil survey project of the U. S. Forest Service in the South Umpqua River drainage and to inspect the particular soil problems of this area.

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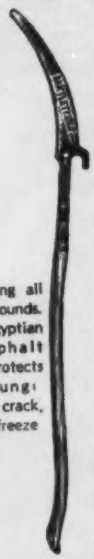

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Continental Can Continues Scholarship Program

Continental Woodlands, a division of Continental Can Company, Inc., has announced that it will again in 1961 continue its forestry scholarship program. Three scholarships, each granting $4,000 for four years of study, will be awarded to three outstanding high school graduates from the portions of five states in which the corporation operates or owns woodlands. The states are Florida, Georgia, South Carolina, Louisiana, and Arkansas.

In announcing these scholarships, T. W. Earle, vice president of Continental Can said: "Trees are one of the South's greatest resources; foresters make them a crop. By these scholarships we hope to encourage outstanding high school graduates to enter and study in the field of professional forestry . . ."

Interassociation Group to Assist in Promoting Forest Products Week

An interassociation committee will assist the International Concatenated Order of Hoo-Hoo in extending the effects of National Forest Products Week, sponsored by Hoo-Hoo.

The committee has made recommendations to Hoo-Hoo through the lumbermen's organization policy committee co-chairman, Martin Wiegand, Sr., Washington, D. C.

Frank Langley, Dierks Forests, Inc., Hot Springs, Ark., is chairman of the policy committee.

Announcement of the cooperation was made by two men named by the interassociation group to represent it in matters dealing with the promotion of the week, scheduled for October.

They are H. P. Newson, director of the Industry Relations Division, National Lumber Manufacturers Association, and Ben G. Rhodes, director of public information, American Forest Products Industries. Both men are headquartered in Washington, D. C.

The announcement also said the committee's first meeting produced assurances that there will be more emphasis on the week at the national level than last year.

Members of the committee, along with Newson and Rhodes, are John J. Mulrooney, National American Wholesale Lumber Association; Robert E. Paine, National Retail Lumber Dealers Association; Theodore H. Davis, American Paper and Pulp Association; and W. C. Hammerle, American Pulpwood Association.

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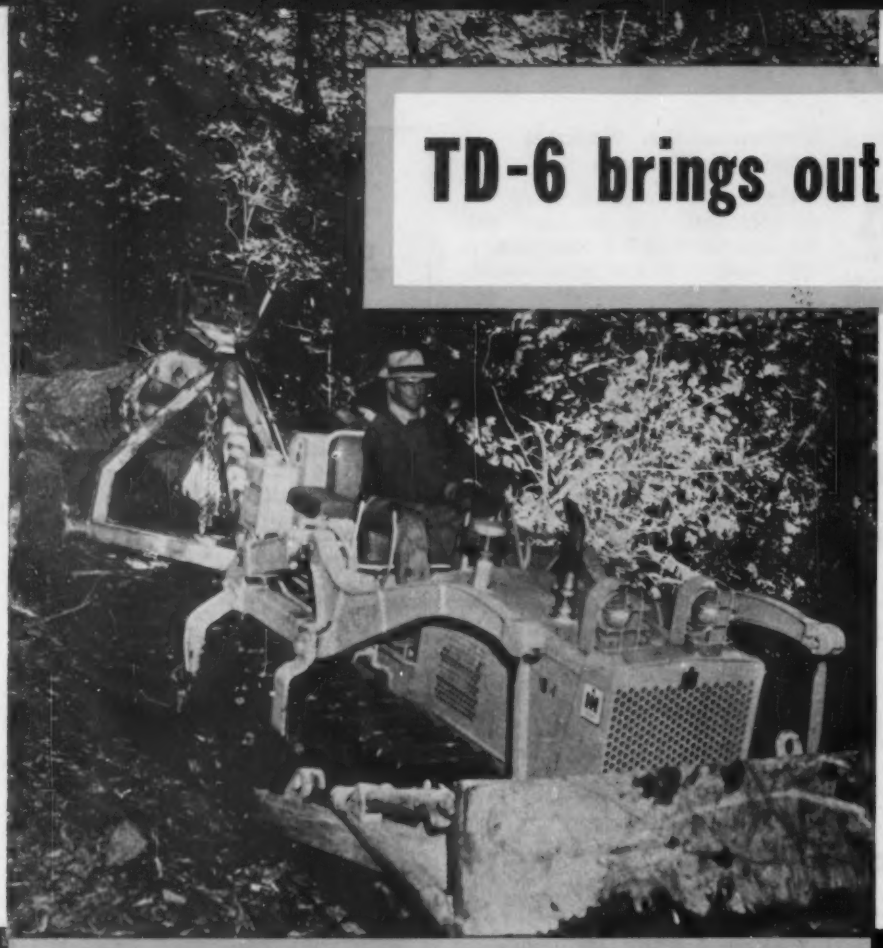
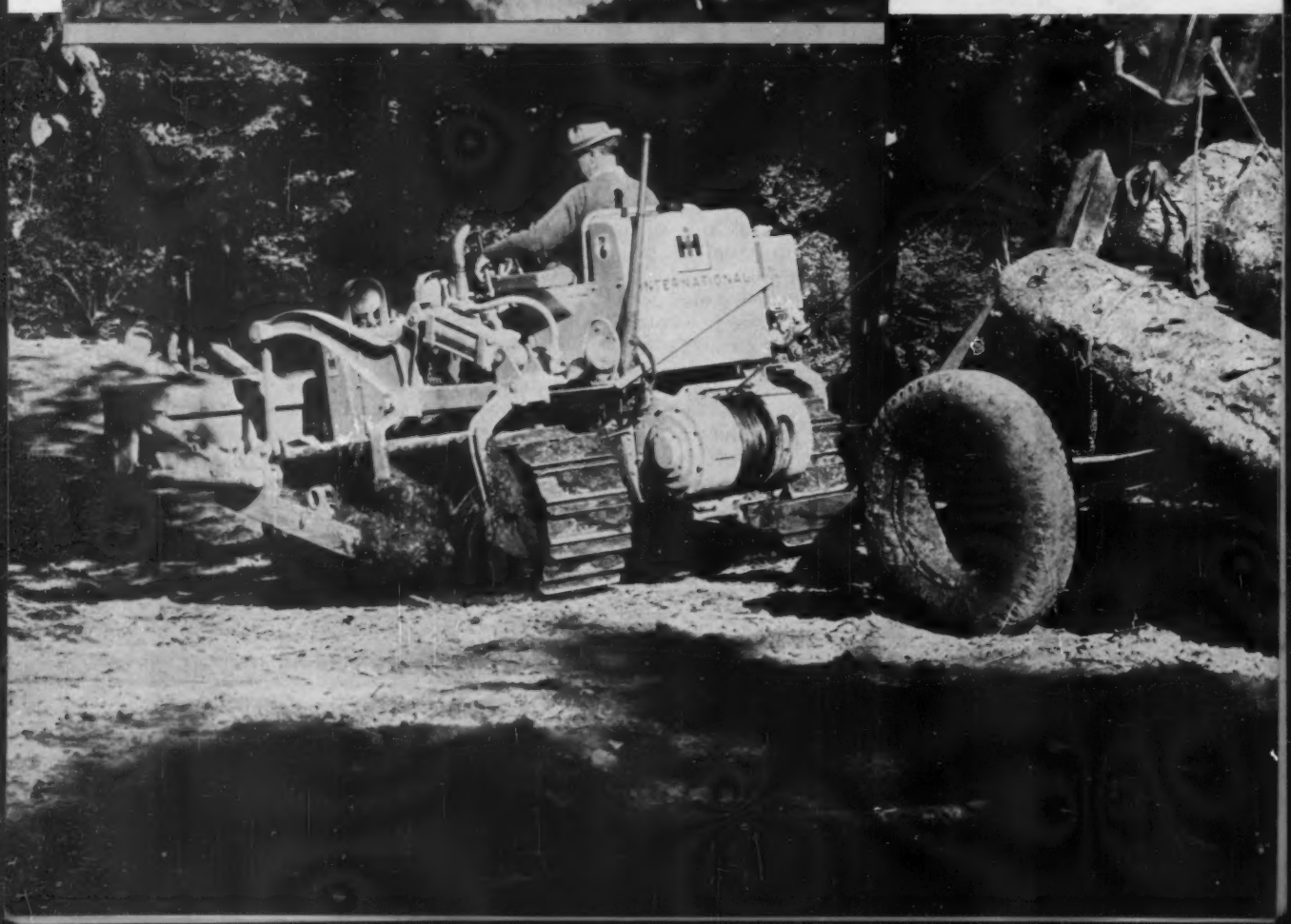


Bardill Land & Lumber Company operates 24,000 acres of hard and softwood timberlands in Vermont, on a sustained yield tree farm basis. This 55-hp TD-6 is used for carting in logs from mountain terrain, builds haul roads, and opens up skid trails.

Winch-equipped to "reach-out" and log terrain too steep to tread over, the Bardill Company's TD-6 gets valuable first-growth timber other rigs couldn't get!



loads...logging steep mountain slopes

—for Bardill Land & Lumber Co., Wolcott, Vermont

From "pockets" on steep mountain slopes that "stumped" logging crews a generation ago, this International TD-6 crawler does a businesslike job of bringing out valuable, first-growth timber.

From the real steep pitches, the "6" winches logs to the haul road. When a load is bunched, the "6" carts 700-800 bf at a time to the truck loading ramp. Owner is Bardill Land & Lumber Co., Wolcott, Vt.

"Our 6-cylinder International TD-6 brings out 150-200 board feet more per load than our former 4-cylinder machine," states manager Justus Wheeler. "In addition, we save 18-20 minutes in faster return from loading dock to woods for another load.

"Here, rough terrain, ledges, and streams restrict us, and we find this TD-6 an ideal size machine as it is more stable and has better work speeds."

Built for rough woods work

For smooth, high-torque, grade-beating work power, the TD-6 has the wallop of the direct-start 6-cylinder 55-hp D-282 Diesel. The TD-6 dry-type engine clutch has a full-face sintered metal driven member —to give high power-transfer efficiency and defy heat.

Only the TD-6 gives you the maximum track-to-ground, traction-getting contact—assured by exclusive International 3-point track suspension.

Whether you're logging the roughest, toughest steepest terrain or ordinary woodlands—for pulpwood or sawlogs—see how the 55-hp International TD-6 can deliver you new operating economy; new production profits. Compare TD-6 operating ease and riding comfort to competitive rigs. Let your International Construction Equipment Distributor demonstrate.

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